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N. J. Agri. Experiment Stations
Bulletin

No. 313, 1917

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THE PARASITIC FUNGI OF NEW JERSEY

NEW JERSEY

AGRICULTURAL

Experiment Stations

BULLETIN 313

NEW BRUNSWICK, N. J.

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New Jersey
Agricultural Experiment Stations

Bulletin 313

The Parasitic Fungi of New Jersey

By

CARL A. SCHWARZE, M.A.

New Brunswick, N. J.
September, 1917

PARASITIC FUNGI OF NEW JERSEY

Introduction

This work is the gradual outgrowth of a plan devised to increase the knowledge pertaining to the parasitic fungi of the state of New Jersey. In developing this plan the writer drew freely from such works as, *Catalogue of Plants Found in New Jersey* by Dr. N. L. Britton (in the *Geological Survey of New Jersey, Report of the State Geologist,* 1889, v. 2, pt. 1, p. 25-642), reports and bulletins of the New Jersey Agricultural Experiment Station, *North American Pyrenomycetes* by Ellis and Everhart, *North American Flora, Mycologia, Bulletin of the Torrey Botanical Club, Grevillea, Proceedings of the Philadelphia Academy of Natural Science,* and publications of the United States Department of Agriculture.

The writer had ample opportunity during the summers of 1912 to 1917, inclusive, to collect and preserve parasitic fungi in the state of New Jersey. This material and "fungi exsiccati" deposited in the herbaria of the New Jersey Agricultural Experiment Station and the New York Botanical Garden afforded the writer excellent opportunities to study the fungous parasites.

The plan formulated at first was to list all fungous parasites recorded for the state of New Jersey and supplement this list with their descriptions and drawings of specimens illustrating the respective genera. This plan, however, was abandoned because many specimens collected and recorded by the pioneer botanists had been incorrectly determined. It was finally decided to publish descriptions and illustrations only of those species which had been studied in the laboratory.

Whenever possible, specimens collected in New Jersey were studied. When no New Jersey material was available specimens from neighboring states were examined.

To gain a broader view of the nature of fungous parasites, cultures were made in many cases on agar media or on the natural host. Whenever possible, therefore, spore measurements and the growth on nutrient media were compared with those displayed by the para-

site on its natural host. In case the original descriptions were meager, inaccurate or obsolete, the descriptions were amplified. Credit is given at the proper place when the description is taken verbatim from a monograph, etc.

All the drawings are original and were made by the author. The same microscope and camera lucida were used and therefore all the fungi were drawn on a uniform scale. The magnification in every instance is appended to the description.

To avoid confusion a generic name of long standing was used. A reference at the proper place was made to the recent terminology.

The writer wishes to thank the members of the staff of the New York Botanical Garden for the permission to examine specimens in the Cryptogamic herbarium, for the library facilities and for many helpful suggestions. The writer is also under great indebtedness to Prof. J. C. Arthur, who not only determined the rusts but freely offered advice and criticised that portion devoted to the *Uredinales,* to Dr. G. P. Clinton for determining the smuts, and to Prof. F. C. Stewart, Geneva, N. Y., Doctors R. A. Harper, W. A. Murrill, F. J. Seaver, A. B. Stout, Donald Reddick, V. B. Stewart, C. L. Shear, J. J. Davis and F. D. Fromme for helpful suggestions.

The writer is also under great indebtedness to Prof. Melville Thurston Cook, head of the Department of Plant Pathology of the New Jersey Agricultural Experiment Station, who directed the work, for his encouragement, advice, helpful suggestions and cooperation in preparing the descriptions, for the arrangement of the plates and for reading the proof.

PLASMODIOPHORA BRASSICÆ Wor.—On the roots of cabbage, cauliflower and related plants. Causes enlargement of the infected parts which are commonly known as "club root" or "finger and toe" disease. The organism lives within the parenchyma cells and stimulates both the infected and the neighboring cells. The medullary rays and cortex become thickened; the sclerenchyma cells suppressed, xylem reduced, and the phloem increased.

1. Diseased cabbage seedling. 2. Diseased root of older plant. 3. Cross-section of diseased root showing organisms within certain cells, 2/3. 4. Plasmodium in cells, 1/6. 5. Plasmodium in 4 distinct divisions showing multinuclei, 1/6. 6. First stage in the formation of spores, 1/6. 7. Second stage in the formation of spores, 1/6. 8. Mature spores, 1/12. 9. Division of spores, 1/12.

SYNCHYTRIUM VACCINII Thomas.—On the cranberry and also on *Gaultheria procumbens, Cassandra calyculata, Kalmia angustifolia, Azalea viscosa, Clethra alnifolia* and *Gaylussacia* sp. and *Vaccinium corymbosum.* Causes small red galls on stems, leaves, flowers and fruits of cranberry and other hosts. Mycelium absent or scanty, producing the globose sporangium within the center of the gall; many motile swarm spores produced from the sporangium.

10, 11, 12. Galls on various parts of cranberry plant. 13. Cross section of the leaf and gall, 2/3.

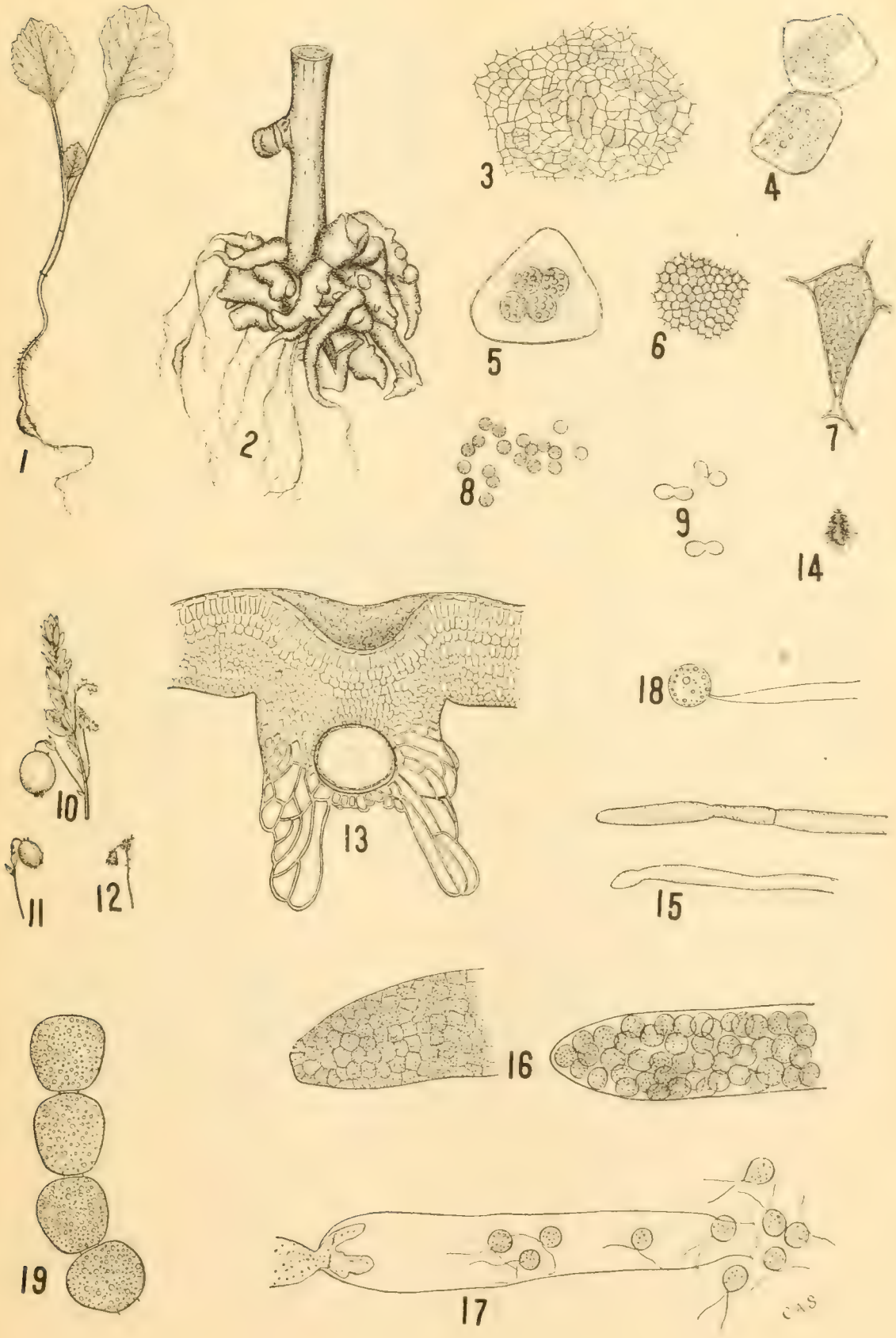
SAPROLEGNIA FERAX* (Gruith) Thuret.—Grows freely on dead flies in water. The slender hyphæ show few septa until the tips are cut off in the formation of the sporangia. Zoosporangia clavate-cylindrical. The zoospores are almost spherical or slightly pear-shaped, biciliate and very active. After the emergence of the zoospores, there is a growth from the base cell into the old sporangium. No oospores were observed.

14. Dead fly covered with the fungus. 15. The immature sporangia, 2/3. 16. Two stages in formation of the spores, 1/6. 17. Emerging of the zoospores and the new growth into the old sporangium, 1/6. 18. Zoospore, 1/12.

ALBUGO BLITI (Biv.) Kuntze.—O leaves of *Amaranthus hybridus, A. chlorostachys,* and other species of *Amaranthaceae.* Causes white to yellowish, prominent, superficial, circular spots, 1-10 mm., which are sometimes confluent. Conidiophores hyaline, cylindric, about 15 x 60 μ. Conidia hyaline and nearly spherical, 8-15 x 15-20 μ.

19. Conidia.

* Syn. *S. ferax* Amct.
Achlya prolifera Pruigsh.
S. *thuretii* de Bary.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ALBUGO CANDIDA (Pers.) Kuntze.—On radish, turnip, shepherd's purse and many other species of Cruciferæ. Causes white or occasionally light yellow blisters (sori) on all parts of the host above ground. Frequently causing pronounced hypertrophies. Conidiophores hyaline clavate, about 35-40 x 15-17 μ; conidia globular, hyaline, thin walls, 15-18 μ.

20. Infected stem of *Capsella bursa-pastoris.* 21 Infected leaf of turnip. 22. Conidiophores, 1/12. 23. Conidia, 1/12. 24. Mature oospore, 1/12.

ALBUGO IPOMOEAE-PANDURANÆ (Schw.) Swing. — On stems, leaves, and sometimes petioles of the sweet potato, *Ipomœa panduratœ, I. hederacea* (seedling) and other species of Convolvulacæ. Causes white, or light yellow blister-like spots and sometimes very pronounced enlargements and distortions of the stems. Spots are usually circular, sometimes confluent and 0.5-20 mm. Conidiophores, hyaline, clavate, unequally curved at base, 15-30 μ; Conidia hyaline, nearly spherical, slightly cylindrical, 14-20 x 12-18 μ.

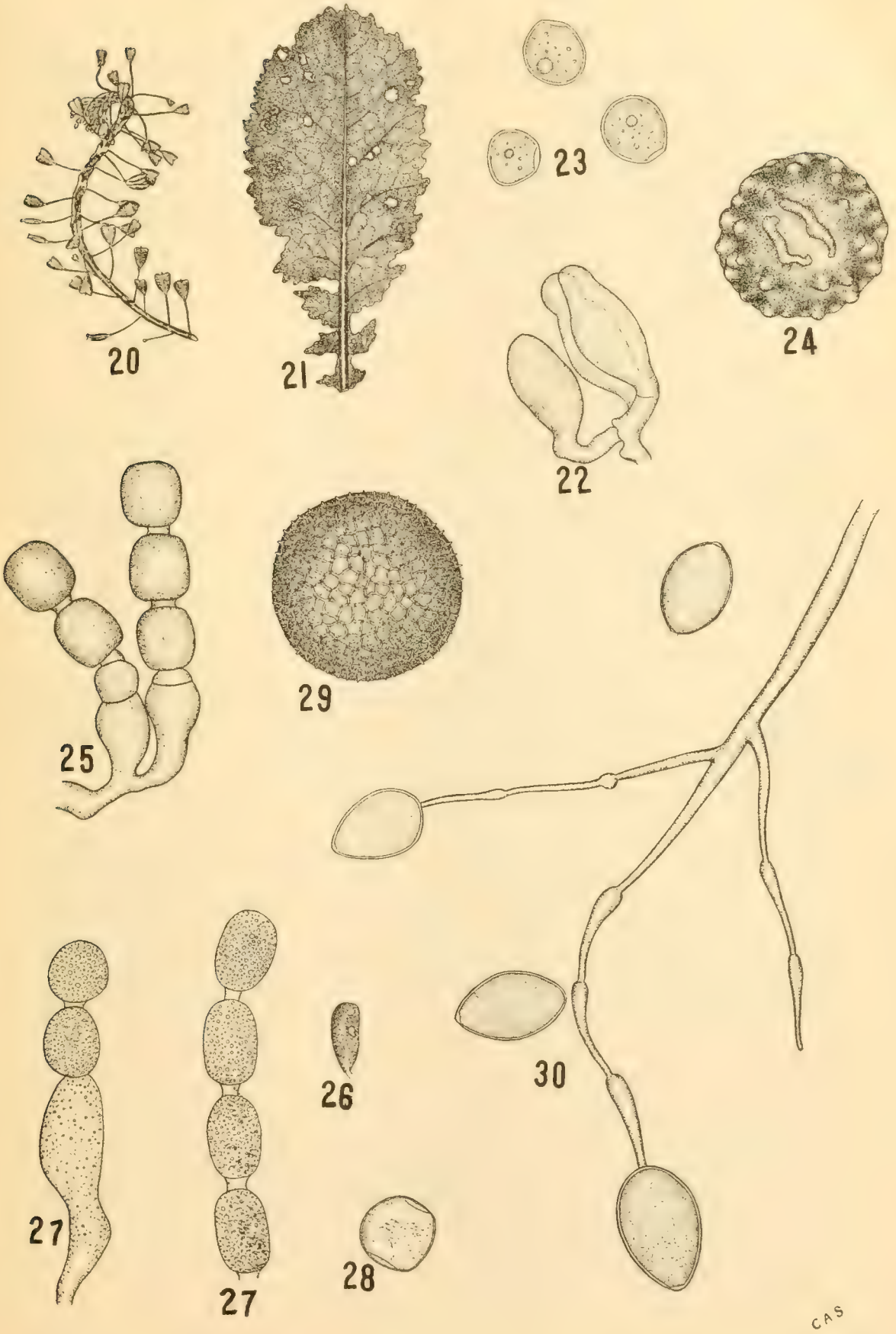
25. Conidiophores and Conidia, 1/12.

ALBUGO PORTULACÆ (D. C.) Kuntze.—On all parts of *Portulaca oleracea* above ground. Causes white to yellowish circular or slightly irregular spots ranging to 5 mm. in diameter. Conidiophores hyaline, clavate about 9 x 25 μ. Conidia varying from spherical at base to cylindrical at tip of chain, walls hyaline, contents light yellow, about 12-15 x 15-22 μ.

26. Infected leaf of *Portulaca oleracea.* 27. Conidiophores and Conidia, 1/12.

ALBUGO TRAGOPOGONIS (D. C.) S. F. Gray.—On salsify and many other Compositæ hosts. On the stems and under-side of leaves. Sori prominent, deep-seated, white or yellowish, circular or elongated, 1-8 x 1-3 mm. Conidiophores, clavate, hyaline, 40-50 x 12-15 μ; Conidia, short-cylindric, the terminal larger and less angular than the lower, membrane with equatorial thickening, hyaline or light yellow, 18-22 x 12-15 μ.

28. Conidium, 1/12. 29. Oospore, 1/12.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PHYTOPHTHORA INFESTANS (Mont.) deBary. — On leaves and stems and in tubers of the potato. Causes large, dark spots on the leaves, appearing somewhat water-soaked and with abundant white growth on lower surface. Spreads rapidly and causes death of plants. Tuber rots, usually beginning at surface; the rot is brown or chocolate-colored, usually irregularly streaked giving a marbled effect. Conidiophores emerging from stomata, single or in clusters of 2 to 4, branching scorpiose-cymosely; conidia ovoid with slight wall near the apex, 27-30 x 15-20 μ.

Common in the mountainous districts of the state and very rare in other parts.

30. Conidiophores and conidia, 1/12.

PHYTOPHTHORA PHASEOLI Thaxter. — On pods, young shoots, flowers and buds of lima beans. Stunts or completely checks the growths which become covered with a dense white mycelium. The conidiophores emerge through the stomata; are single or clustered, simple or branched from below and cymosely branched above swellings near the tips; conidia oval or elliptic, papillate, 35-50 x 24 μ.

Common throughout the state.

31. Conidiophores and conidia, 1/12. 32. Immature conidium, 1/12.

RHYSOTHECA AUSTRALIS (Speg.) Wilson. — On leaves of *Sicyos angulatus* L. Causes spots of various sizes and shapes but bounded by leaf veins. Conidiophores arising in clusters from the stomata, 500-650 x 9-11 μ, with 5-7 main branches; the last branches, 10-14 μ. Conidia ellipsoid, 14-17 x 10-13 μ.

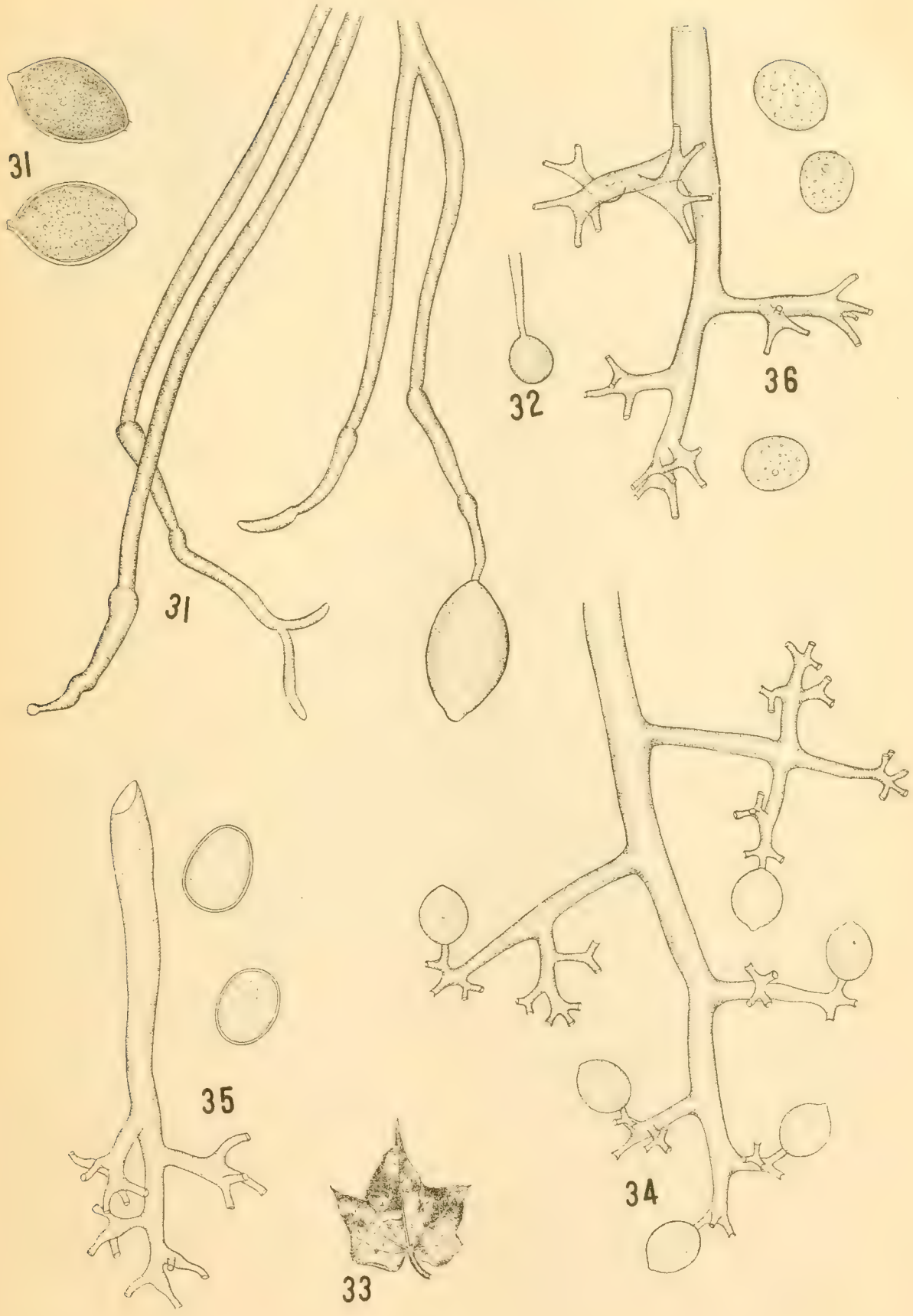
33. Infected leaf of *Sicyos angulatus*. 34. Conidiophores and conidia, 1/12.

RHYSOTHECA GERANII Peck.—On the leaves *Geranium carolinianum*. On the under side of the leaf; conspicuous downy white, definite areas; conidiophores fasciculate, monopodially 2-3 branched, branches short, 90-350 x 9-12 μ; conidia obovoid, hyaline 18-25 x 15 μ.

35. Conidiophores and conidia, 1/12.

RHYSOTHECA HALSTEDII (Farlow) Wilson.—On the lower leaves of *Ambrosia artemisiifolia*. Originates as small spots finally covering the entire leaf which turns yellow. Conidiophores fasciculate, slender, 300-750 μ, alternately branched 3-5 times, final branches 8-15 long, conidia oval or elliptical, 18-30 x 14-25 μ.

36. Conidiophores and conidia, 1/12.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RHYSOTHECA POTENTILLÆ de Bary.—On the under surface of the leaves of *Potentilla*. Causes spots bounded by the veins which are yellow above and smoky below. Conidiophores in tufts, 5-6 times dichotomously branched, branches moderately elongated, tips bluntly pointed, conidia ellipsoid, obtuse, smoky-colored, oospores, 20-26 x 15-19 μ; oospores spherical, yellow, smooth, 22-24 μ in diameter.

37. Conidiophores and conidia, 1/12.

RHYSOTHECA VIBURNI (Peck) Wilson.—On leaves of *Viburnum lantana*. Causes irregular spots with various sizes on margins or along larger veins, covered on under surface with sparing white downy growth. Spot discolorations ranging none to dark reddish-brown or chocolate color. Conidiophores clustered, 300-600 x 6-8 μ, 2-4 branched, last branchlets 6-8. Conidia elliptical, sometimes globose, 15-30 x 12-15 μ.

38. Conidiophores and conidia, 1/12.

RHYSOTHECA VITICOLA* (B. & C.) Wilson.—On leaves, stems and sometimes on fruits of both wild and cultivated grapes. Causes spots of various sizes and forms on leaves, yellowish on upper and whitish on lower surface, becoming brown with age. Dr. B. D. Halsted also reports it on *Parthenocissus tricuspidata* (N. Am. Fungi, 2427 b, on *"Ampelopsis ritchii,"* error for horticultural name of *A. veitchii.*) Diseased fruit rot. The affected surface of the stem and fruit and under surface of leaf covered with a white downy growth of aerial hyphæ which become brown. Conidiophores arise from stomata in clusters, 250-850 x 5-8 μ. 4 or 5 times branched, the last branches about 8. Conidia elliptic-ovate, 9-12 x 12-30 μ.

Very common in vineyards.

39. Infected grape leaf. 40. Conidiophores and conidia, 1/12.

*Plasmopora viticola.

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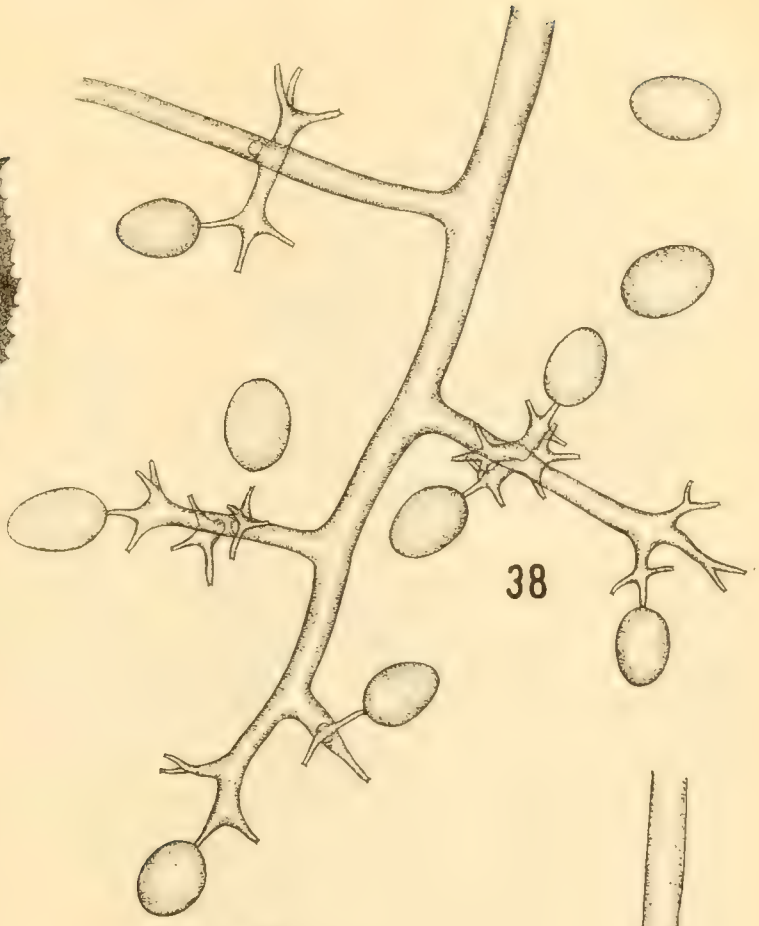
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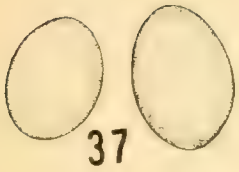
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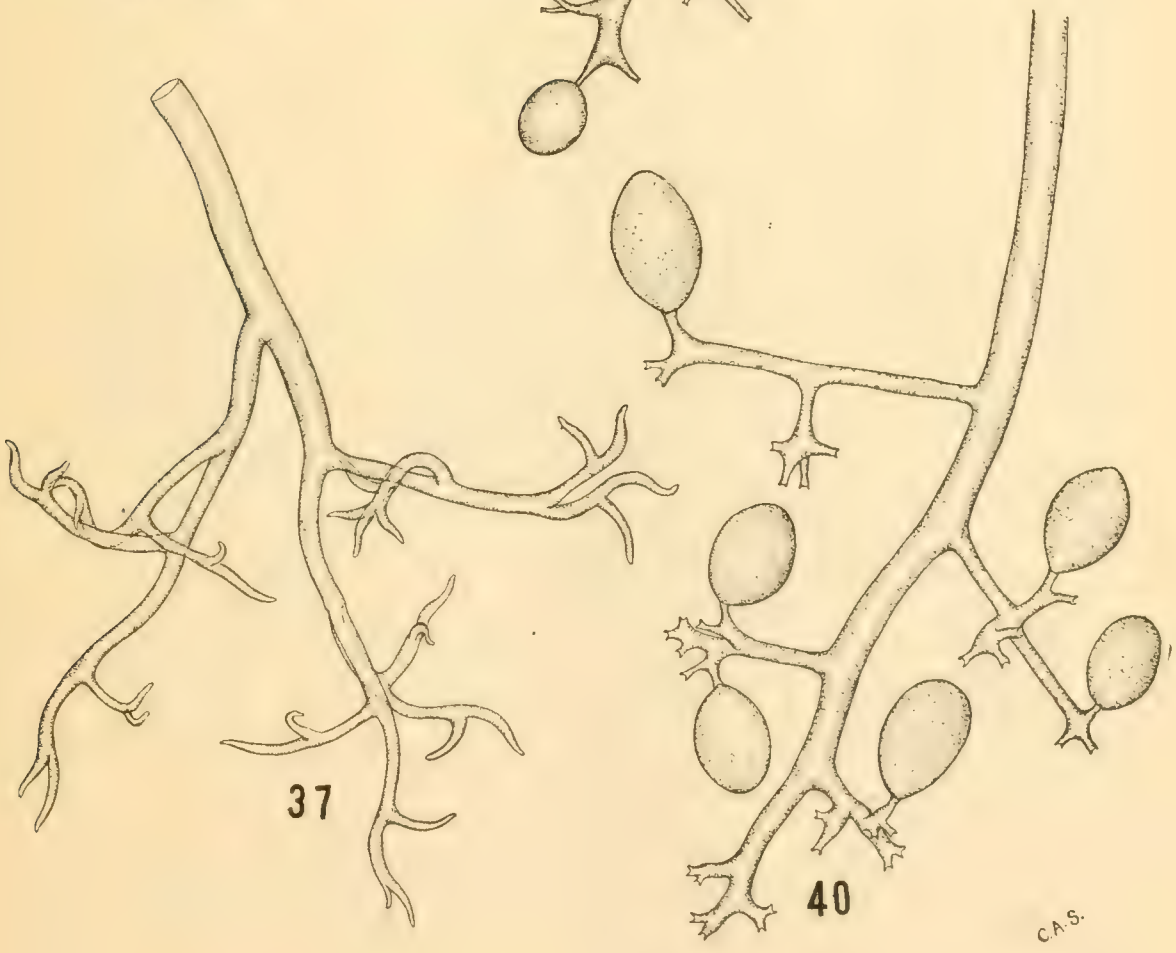
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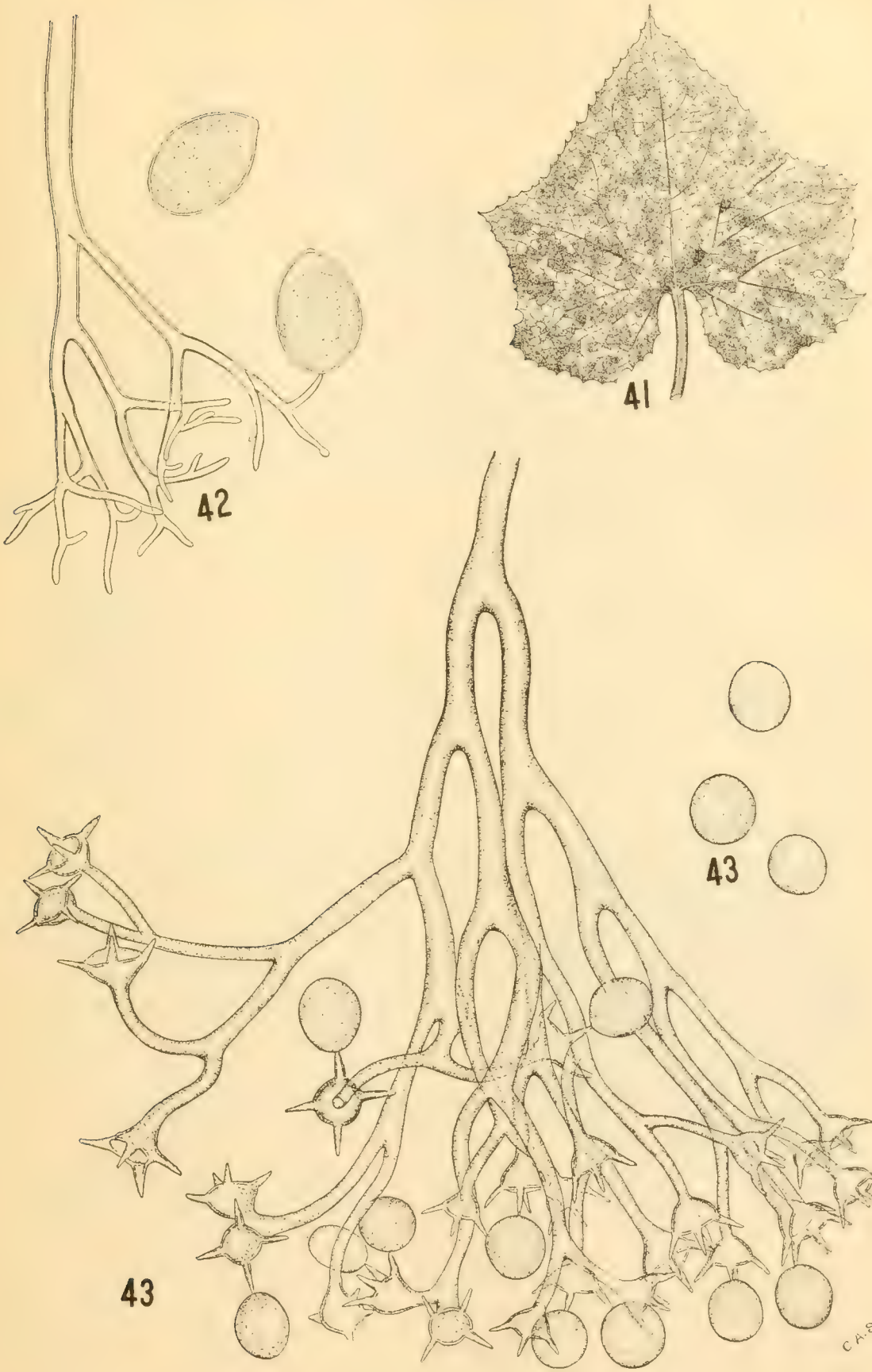
PSEUDOPERONOSPORA CUBENSIS (B. C.) Rostew.—Attacks leaves of cucumbers, cantaloupe and other members of the family Cucurbitaceæ. Causes indefinite, yellow spots which frequently unite; leaf dies, blackens and shrivels. Conidiophores arise from the stomata of the lower surface and sometimes from the upper surface, 180-400 x 5-9 μ, 3-4, sometimes 2-5 times branched, forming acute angle; conidia gray or brownish, ovoid to ellipsoid, papillate, 20-40 x 14-25 μ.

41. Infected leaf of cucumber. 42. Conidiophores and conidia, 1/12.

BREMIA LACTUCÆ Reg.—On the leaves of lettuce and other Compositiæ. Causes a wilting and dying of the leaves. Conidiophores most common on under surface of leaves but sometimes on the upper surface, single, numerous, much branched, each tip bearing a disk with four tips for the spores. Conidia ovate, 16-22 x 15-20 μ.

43. Conidiophores and conidia, 1/12.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PERONOSPORA EFFUSA (Grev.) Rab.—On leaves of spinach and other species of Chenopodiaceæ and on some species of Plantaginaceæ. Causes water-soaked spots and finally the death of the diseased parts. Yellowish or brownish discolorations on the under side of the leaf. Conidiophores violet-tinted in mass, 150-400 x 7-9 μ, branched with rather wide angles. Conidia ellipsoid to globose, violet or smoky, 17-18 x 22-24 μ.

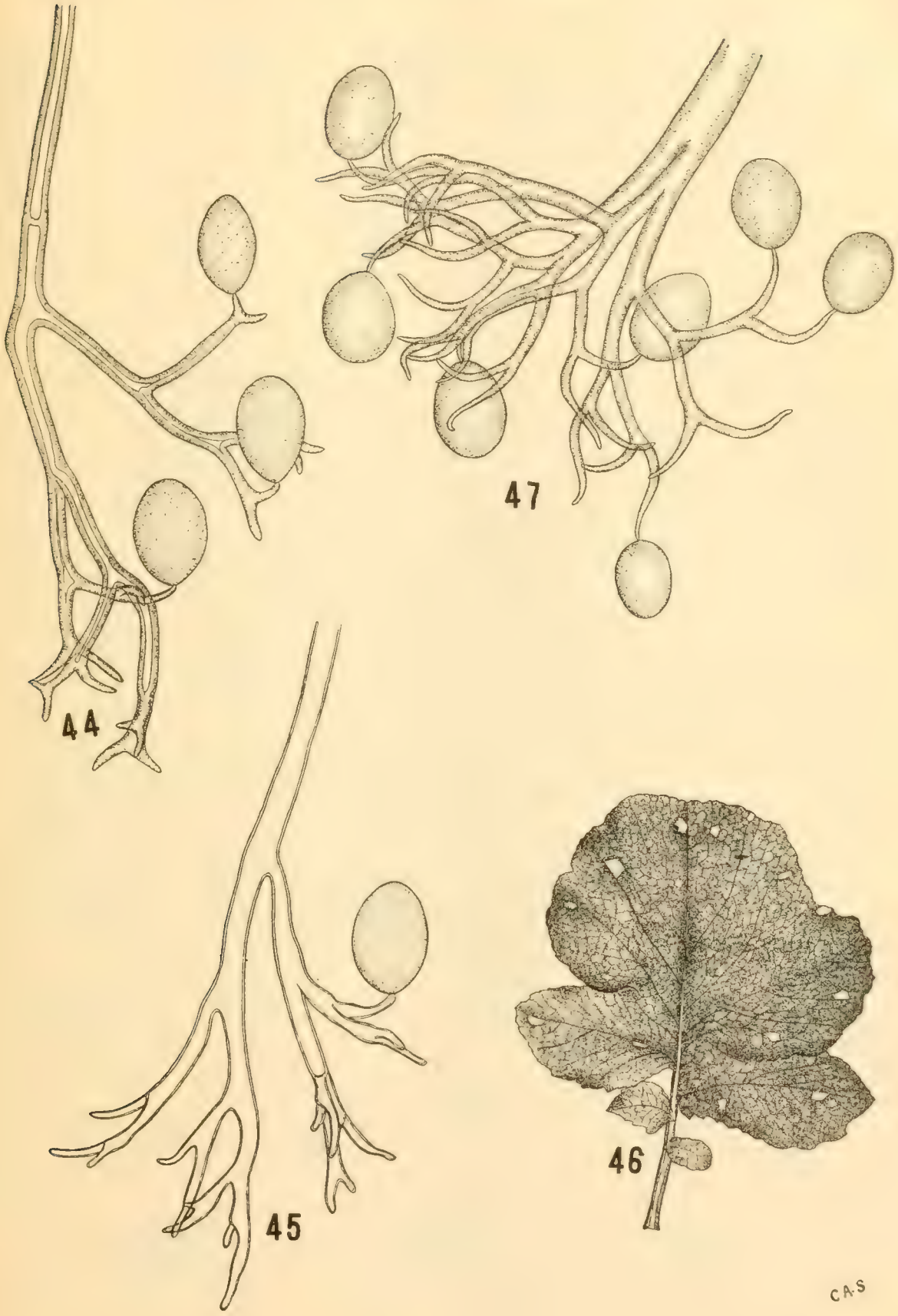
44. Conidiophores and conidia, 1/12.

PERONOSPORA LEPIDII (McAlp.) Wilson.—On the leaves and stems of Lepidium. Causes a dense white growth with more or less indefinite boundaries. Conidiophores, 130-223 x 4-9 μ, erect, 3-8 times branched, ultimate branches arising at acute angles about 3-8 μ; conidia ellipsoidal or nearly globose, 18-35 x 15-23 μ.

45. Conidiophores and conidia, 1/12.

PERONOSPORA PARASITICA (Pers.) de Bary.—On leaves and stems of most Cruciferæ, among which are the following economic forms: cabbage, cauliflower, radish, collards, turnips and horse-radish. Diseased parts are covered with a dense white fungus growth and frequently hypertrophy. Conidiophores densely branched, the last branches very slender and arising at acute angles, 200-300 x 24-27 μ; conidia elliptical to globose and 12-22 x 24-27 μ, hyaline or nearly hyaline.

46. Infected leaf of radish. 47. Conidiophores and conidia, 1/12.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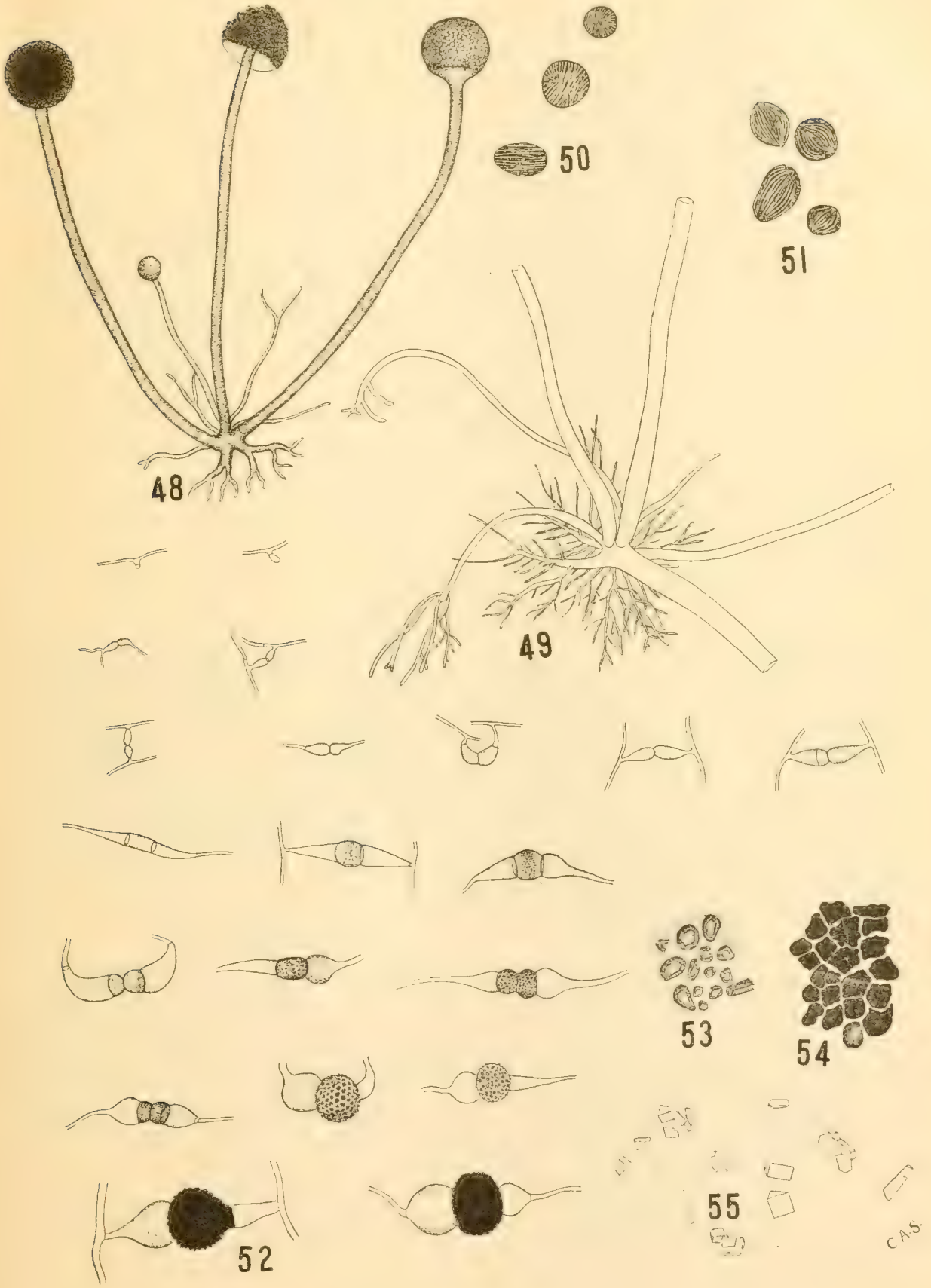
C.A.S

RHIZOPUS NIGRICANS Ehr.—On sweet potatoes and other vegetables, and also on fruits in storage. Causes a soft rot. Luxuriant growth of white mycelium becoming almost black at maturity. Rhizoids abundant. Sporangiophores erect, fascicled and without septa. Sporangia almost spherical, blackish-olive. Columella hemispheric. Spores abundant, almost spherical, gray or brown, 11-14 μ.

48. Entire plant, 2/3. 49. Base of plant, 2/3. 50. Sporangia spores, 1/12.

RHIZOPUS BATATAS Nakazawa. — On sweet potato. Causes a storage rot. Colonies snow-white, gradually becoming black. Sporangiophores in groups of 1-7 and 100 to 500 mm. in height, walls smooth and thick. Sporangium globular and 50-150 μ in diameter averaging 110 to 120 μ, white becoming black. Columella usually globular, 42-100 μ. Spores irregular in form with a wrinkled outer wall, gray to dark brown in color, 3.5-5.2 x 4.4-12.3 μ. Inter callary cells variably formed, 12-60 μ.

51. Sporangia spores, 1/12. 52. Stages in the formation of the zygospore, 2/3. 53. Wall of immature zygospore, 1/12. 54. Wall of mature zygospore, 1/12. 55. Crystals from zygospores, 1/12.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TAPHRINA AUREA (Pers.) Fries.—On the leaves and inflorescence of the *Populus*. Causes a blistered appearance and covering of golden powder. Asci attenuated at base and immersed in the matrix, sometimes clavate, apex truncate, length 92-100 x 16-25 μ; spores globular, numerous and variable in size.

56. Asci and ascospores, 1/12.

TAPHRINA COERULESCENS (D. & M.) Tul.—Causes bluish blisters on the oak; asci elongated, broadly cylindrical, 55-78 x 18-24 μ, spores breaking up into numerous small, condidia. Our material corresponds quite well with the original description (*Ascomyces cærulescens*).

57. Asci and ascospores, 1/12.

TAPHRINA CERASI (Fck.) Sad.—On the leaves of the cultivated cherry. Causes a deformation resulting in a witch's broom. Asci, 25-33 x 6-9 μ; stalk cells, 10-17 x 5-7 μ; asci round or oval and approximately 8 in number.

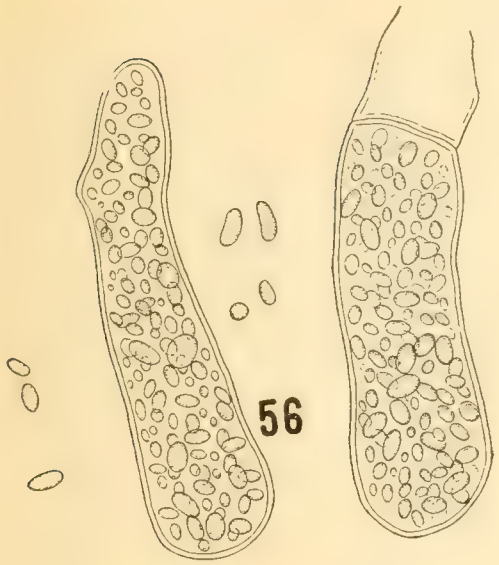
58. Asci and ascospores, 1/12.

TAPHRINA DEFORMANS (Fcl.) Tul.—On the leaves, young fruit, twigs of the peach. Causes leaves to curl, frequently becoming pink or yellowish, and causes blisters on twigs and fruit. Asci are formed just below the cuticle on the lower surface. They are cylindrical to slightly clavate, the ends rounded or truncate, 25-40 x 8-11 μ; the stalk cells, 6-8 x 6-10 μ; frequently tapering towards the base; 4-8 asco-spores are sub-globose or oval and measure 3-5 x 4-6 μ. They frequently go through a process of budding either before or after escaping, and produce conidia.

59. Infected peach leaf. 60. Asci and ascospores, 1/12.

TAPHRINA PRUNI (Fckl.) Tul.—On plums and cherries. Causes the "plum pockets," a bladdery-like growth of the fruits, and also attacks very young shoots. The asci are formed early in great numbers, breaking through and almost destroying the cuticle. Asci long and cylindrical, 30-60 x 8-15 μ; spores 8, globose, 3.5-5 μ.

61. Infected plum fruit. 62. Asci and ascospores, 1/12.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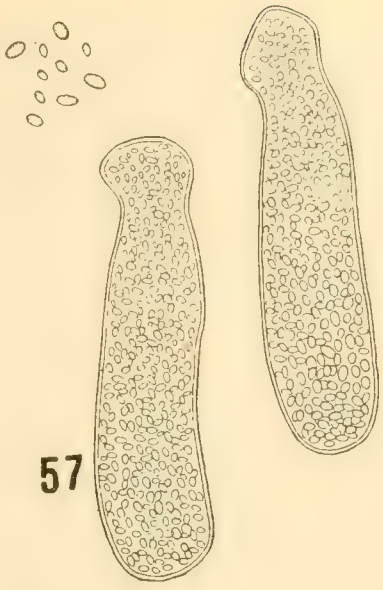
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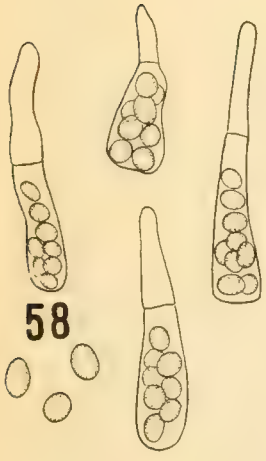
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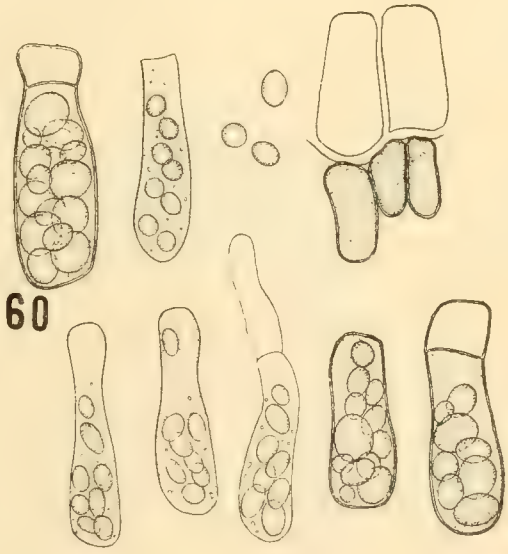
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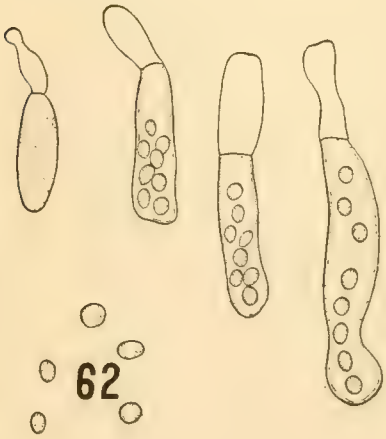
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SCLEROTINIA FRUCTIGENA (Pers.) Schr.—On the fruit, flowers, leaves and stems of peach, plum and cherry, and other drupaceous fruits. Causes a rotting of the fruit; dying of blossoms, young twigs and young shoots early in the season; and the formation of cankers on the twigs and smaller branches. The conidial stage (*Monilia fructigena* Pers., page 114) is most conspicuous on fruits, many of which cling to the tree as mummies. The conidiophores and conidia in mass appear as a dense gray, brownish or ochraceous mold-like growth. The conidia measure about 20.9 x 12.1 μ. The apothecia are rare in New Jersey. They are produced from the sclerotia on the fallen mummied fruits and measure about 0.5-3 cm. in height; the stem is dark brown and the disk somewhat lighter and measures about 5-8 or occasionally as much as 15 mm. in diameter; asci 125-215 x 7-10 μ; ascospores ellipsoidal and 10-15 x 5-8 μ.

63. Infected peach twig showing cankers. 64. Chain of conidia, 1/6. 65. Same, 1/12. 66. Germinating conidia, 1/6, 1/12. 67. Apothecia from mummied fruit. 68. Ascus, 1/12.

PSEUDOPEZIZA MEDICAGINIS (Lib.) Sacc.—On leaves of alfalfa. Causing irregularly distributed circular, yellowish to brown or black spots which are visible on both surfaces of the leaf but most prominent on the upper; boundary slightly irregular and not sharply defined; varying from mere specks to about 1.5 to 2 mm. in diameter. The spots appear early in the season but the apothecia are rather slow in forming and are usually most abundant in the fall. The apothecia are very small, amber or black shiny elevations. The asci are elongated and contain 8 spores; the paraphyses are filiform to clavate; the spores are hyaline, non-septate, elliptical and 8-11 x 4-6 μ.

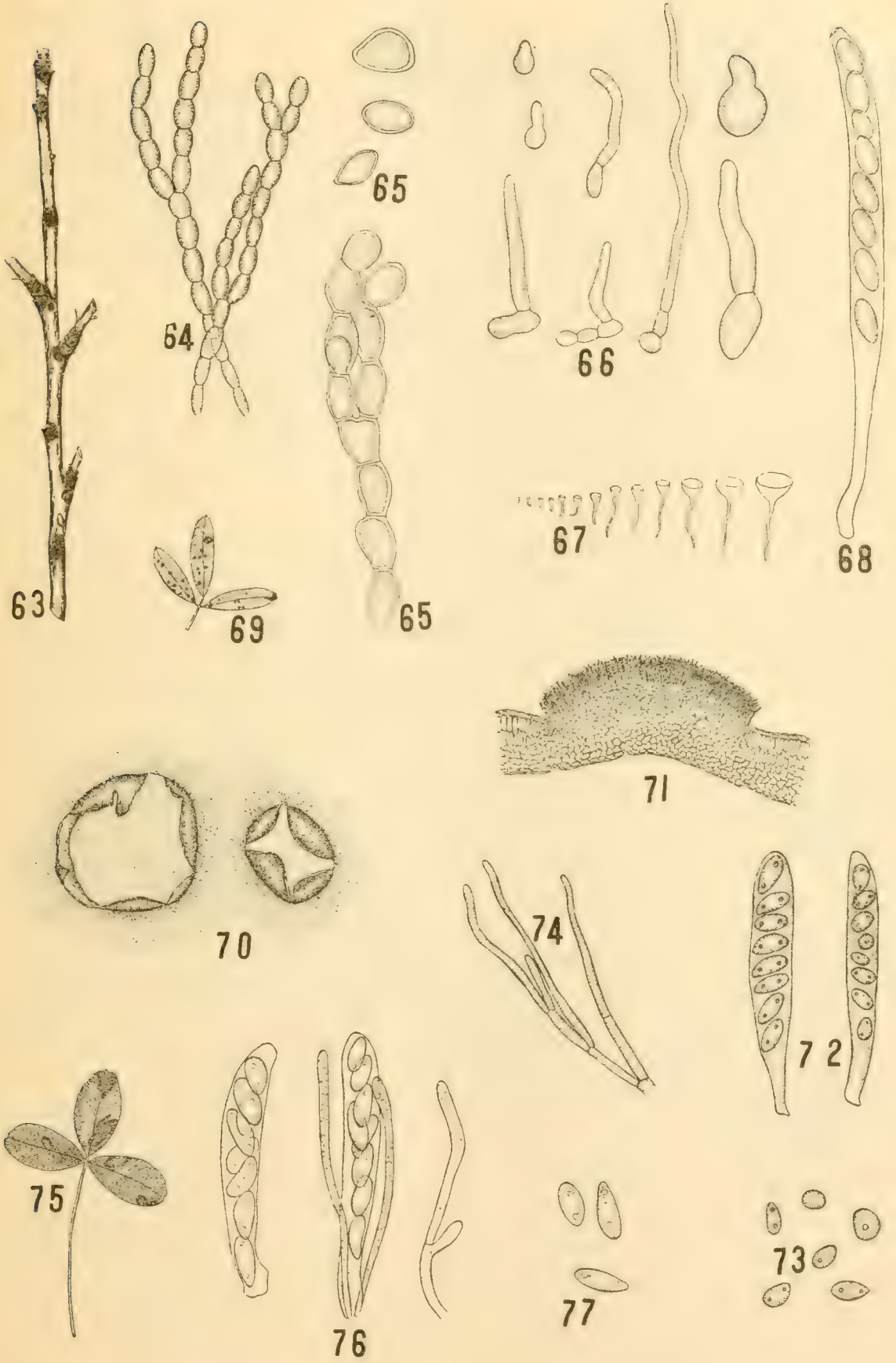
69. Infected leaf of alfalfa. 70. Surface view of the apothecia, 2/3. 71. Cross-section of same, 2/3. 72. Asci, 1/12. 73. Ascospores, 1/12. 74. Paraphyses, 1/12.

PSEUDOPEZIZA RIBIS Kelb. (= *Glœosporium ribis* (Lib.) M. & D., page 102).

PSEUDOPEZIZA SALICIS (Tul.) Pot. (= *Glœosporium salicis* West., page 102).

PSEUDOPEZIZA TRIFOLII (Pers.) Fckl.—On leaves of clover. Causes brown or yellowish-brown oval or irregular spots, sometimes with light centers, and about 0.5 mm. in diameter. Conidia in numerous small, light-brown cup-shaped pycnidia, and are ovoid-oblong and 5 μ, bi-guttulate; asci and ascospores similar to those of *P. medicaginis* and measure about 10-14 x 5-6 μ. Ascocarps develop on the dead spots; ascospores elliptic, 10-14 x 5-6 μ.

75. Infected leaf of clover. 76. Asci and paraphyses, 1/12. 77. Ascospores, 1/12.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FABRAEA MACULATA (Lev.) Atk. (= *Entomosporium maculatum* Lev., page 94).

RHYTISMA ACERINUM (Pers.) Fr. (= *Melasmia acerina* Lev., page 94).—On the leaves of the maple. Causes the so-called tar spots which are at first yellow, becoming thick and black. The conidiophores are short; conidia numerous, small, hyaline and 1-celled; the apothecia ripen in the spring; they are arranged radially; the asci are 120-130 x 9-10 μ and the spores 65-80 x 1.5-3 μ; the paraphyses numerous and incurved or hooked.

78. Infected leaf of maple. 79. Cross-section of apothecia showing asci, 2/3. 80. Ascus, 1/12. 81. Ascospores, 1/12.

LOPHODERMIUM BRACHYSPORUM Rost.—On the leaves of the pine. Asci cylindric, short-stalked, rounded apex, 120-20 x 25 μ, 8-spore; paraphyses bacillar with apices curved; spores oblong, hyaline, 28-30 x 9-10 μ.

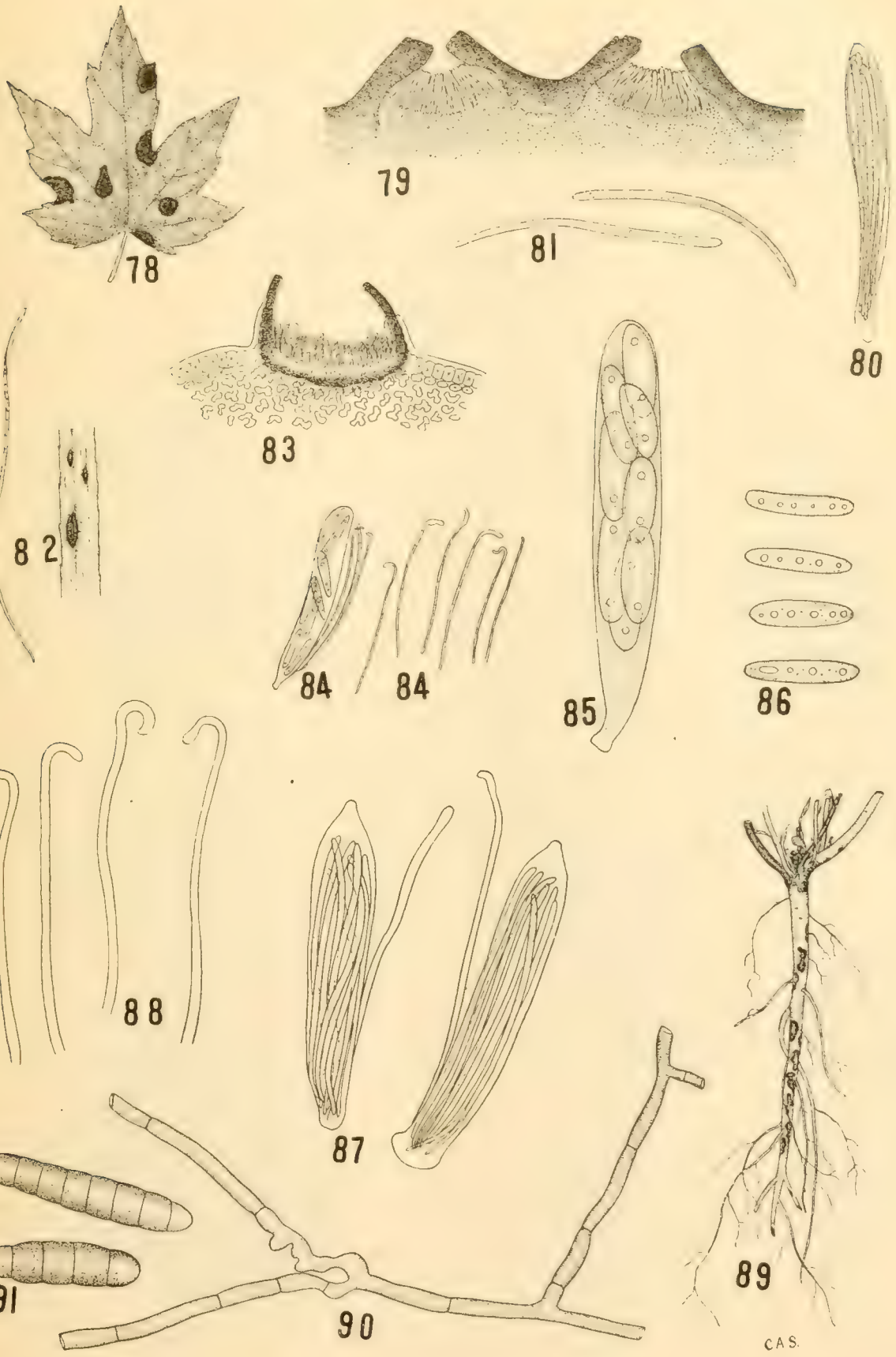
82. Infected needle of *Pinus excelsa*. 83. Cross-section of perithecium, 2/3. 84. Ascus and paraphyses, 1/6. 85. Ascus, 1/12. 86. Ascospores, 1/12.

LOPHODERMIUM PINASTRI (Schr.) Chev.—On pine needles, causing them to fall; conidia (formed the first year) are cylindrical, hyaline, continuous, 6-8 x 1 μ. The ascocarps, formed the second year) are scattered, black, 1 mm. or less in length; asci somewhat clavate and 8-spored; ascospores cylindrical, nearly as long as the ascus, 90-120 x 1.5 μ; paraphyses long, slender, and with curved tips.

87. Asci containing spores, 1/12. 88. Paraphyses, 1/12.

THIELAVIA BASICOLA (B. & Br.) Zopf.—On the roots of alfalfa, sweet pea, horse-radish and other plants. Causes a root rot. Conidia hyaline, 10-20 x 4-5 μ; chlamydospores in chains separating, short cylindrical, 5-8 x 12 μ; perithecia, 80-100 μ; asci ovate; ascospores non-septate, chocolate-colored.

89. Root of alfalfa showing cankers. 90. Mycelium, 1/6. 91. Chlamydospores, 1/12.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PENICILLIUM LUTEUM Zuk. — On the roots of the sweet potato. Causes a rot. Produces abundant lemon-yellow mycelium through the potato; conidiophores floccose and spreading, 20-100 μ (mostly 30-60 by 3 μ); conidia elliptical or fusiform, greenish, 2.4 x 2.3 μ; perithecia smooth, brown and finally brick-red. Asci small, numerous, globular to ovate and containing 8 spores. Spores, ovate to ovate-oblong and ridged, at first hyaline, becoming light brown. All attempts to germinate these spores failed.

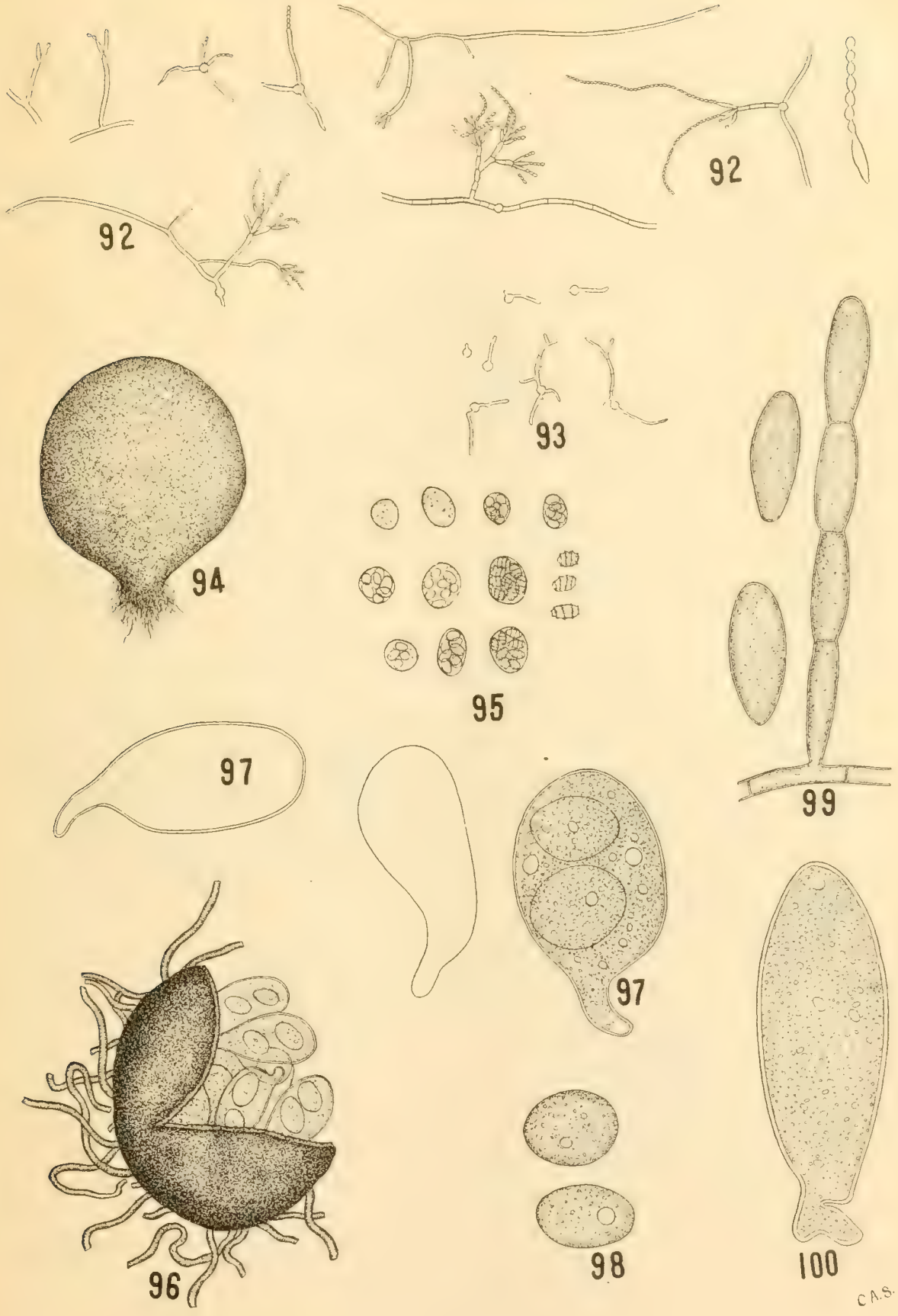
92. Germinating conidia, conidiophore and spores in hanging drop culture, 1/6. 93. Germinating spores, 1/6. 94. Perithecium, 2/3. 95. Asci and ascospores, 1/12.

ERYSIPHE CICHORACEARUM D. C. (= *Oidium ambrosiæ* Thüm, page 116).—On green parts of a number of plants. Causes whitish, sometimes pinkish, downy growth which is usually evanescent. Conidia small, white, elliptic, 4-5 x 7-5.3 μ. Perithecia grouped or scattered and 80-140, sometimes 180 μ, in diameter. Appendages brown and variable in number and size. Asci 4 to 36, usually 10-15, and variable in size and shape, ovate or subcylindrical to broadly ovate stalked, 58-90 x 30-35 μ. Ascospores 2, occasionally 3, 20-28 x 12-30 μ.

96. Perithecium, 1/6. 97. Asci, 1/12. 98. Ascospores, 1/12.

ERYSIPHE GRAMINIS D. C. (= *Oidium monilioides* Lk., page 116).—On the leaves and sometimes on other parts of wheat, barley and other cereals. Causes white, grayish or brownish, moldy patches on affected parts. Conidia ovoid, whitish, 25-30 x 8-10 μ. Perithecia 135-280 μ, usually about 200 μ, scattered or grouped. Asci 9-30, cylindric or ovate-long, more or less pedicilate, 70-180 x 25-40 μ. Spores 8, occasionally 4, 20-23 x 10-13 μ, and seldom maturing on living host.

99. Conidiophore and conidia, 1/12. 100. Immature ascus.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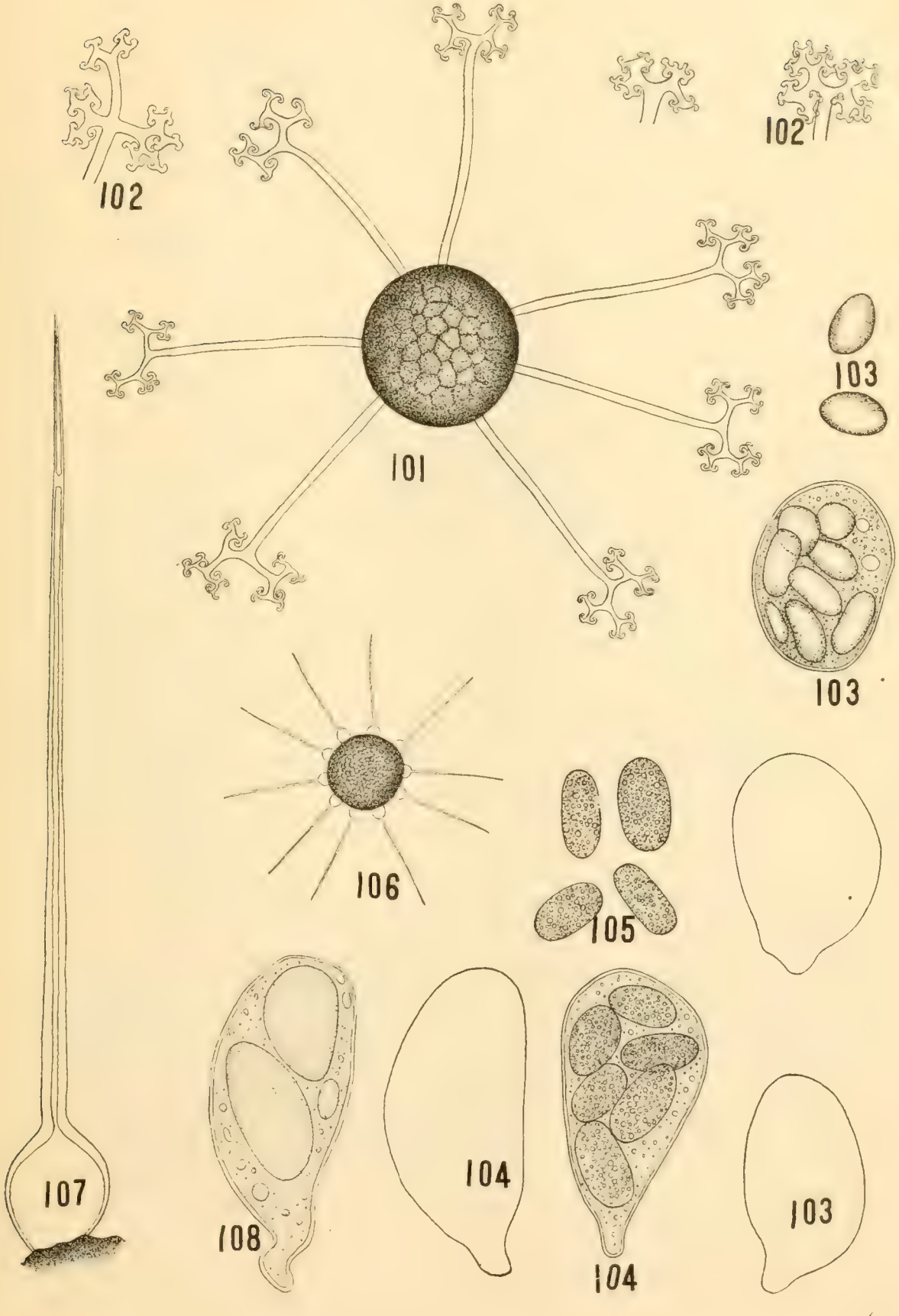
MICROSPHÆRA ALNI (Wal.) Wint. — On leaves of lilac, alders, oaks and many other plants. Producing persistent or non-persistent mycelium. Perithecium scattered or grouped, and variable in size, 66-110 μ, occasionally 135 μ. Appendages irregular, 3-6 times dichotomously branched, tips of final branches recurved. Asci 3-8, ovate or ovate-globose, 42-70 x 32-50 μ, usually with short stalks; 4-8 spores, 18-23 x 10-12 μ.

101. Perithecium, 1/6. 102. Tips of appendages, 1/12. 103. Immature ascus and spores, 1/12. 104. Mature ascus, 1/12. 105. Ascospores, 1/12.

PHYLLACTINIA CORYLEA (Pers.) Karst.—On the leaves of oaks, alders, and many other plants. Produces evanescent, sometimes persistent mycelium on the under and sometimes on the upper surface of the leaves. Perithecia scattered or grouped, 140-270 μ, rarely 350 μ; appendages 5-18, equatorial. Asci 5-45, subcylindrical to ovate-oblong, 60-105 x 25-40 μ; more or less stalked, 2, rarely 3 spores, 30-42 x 16-25 μ.

106. Perithecium, 2/3. 107. Appendage, 1/6. 108. Ascus, 1/12.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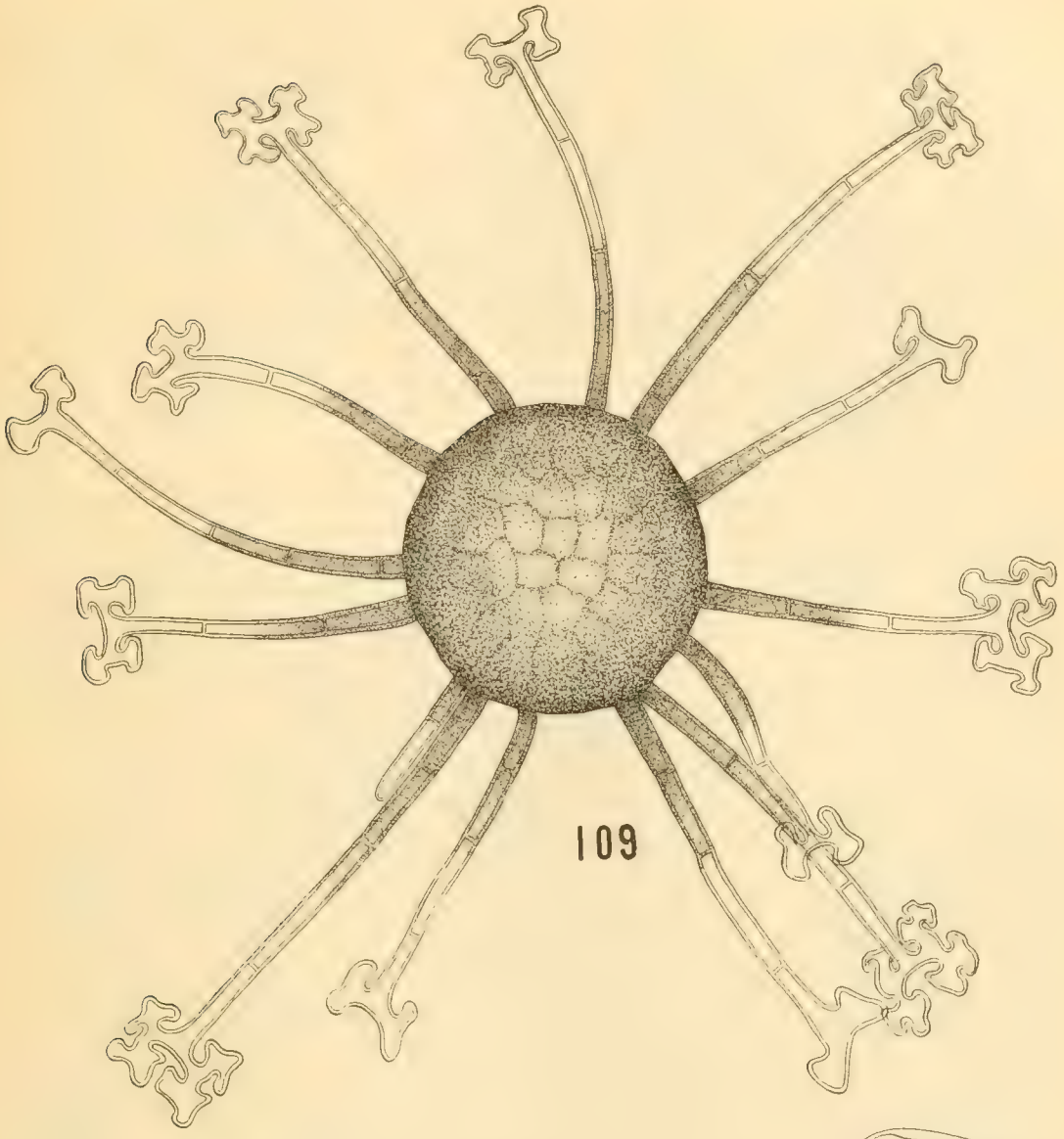
PODOSPHAERA OXYACANTHÆ (D. C.) de Bary (= *Oidium crataegi* Grogn., page 116).—On leaves and other green parts of cherry, cratægus and other pomaceous and drupaceous fruits. Produces meager but rather persistent mycelium. Perithecia scattered or grouped, 64-90 μ; appendages arranged more or less equatorially, variable in number (4-30) and length, dichotomously branching, each branch more or less knob-shaped. Asci broadly obovate or subglobose, 58-90 x 45-75 μ; spores 8, rarely 6, 18-30 x 10-17 μ.

109. Perithecium, 1/6. 110. Immature asci, 1/12. 111. Mature ascus, 1/12. 112. Ascospores, 1/12.



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SPHÆROTHECA HUMILI var. *fuliginea* (Schl.) Sal. (= *Oidium fragariae,* page 116). — On flowers, leaves and stems of hops.* Causes circular, white, powdery spots which enlarge and unite, forming large irregular areas. Most severe on the young tender parts. White downy growth disappears with age leaving brown spots. The perithecia are formed in these brown areas. Perithecia not more than 50 μ in diameter, appendages short and light brown. Asci broadly elliptic to sub-globose and containing 8 spores each. Ascospores 20-25 x 12-18 μ.

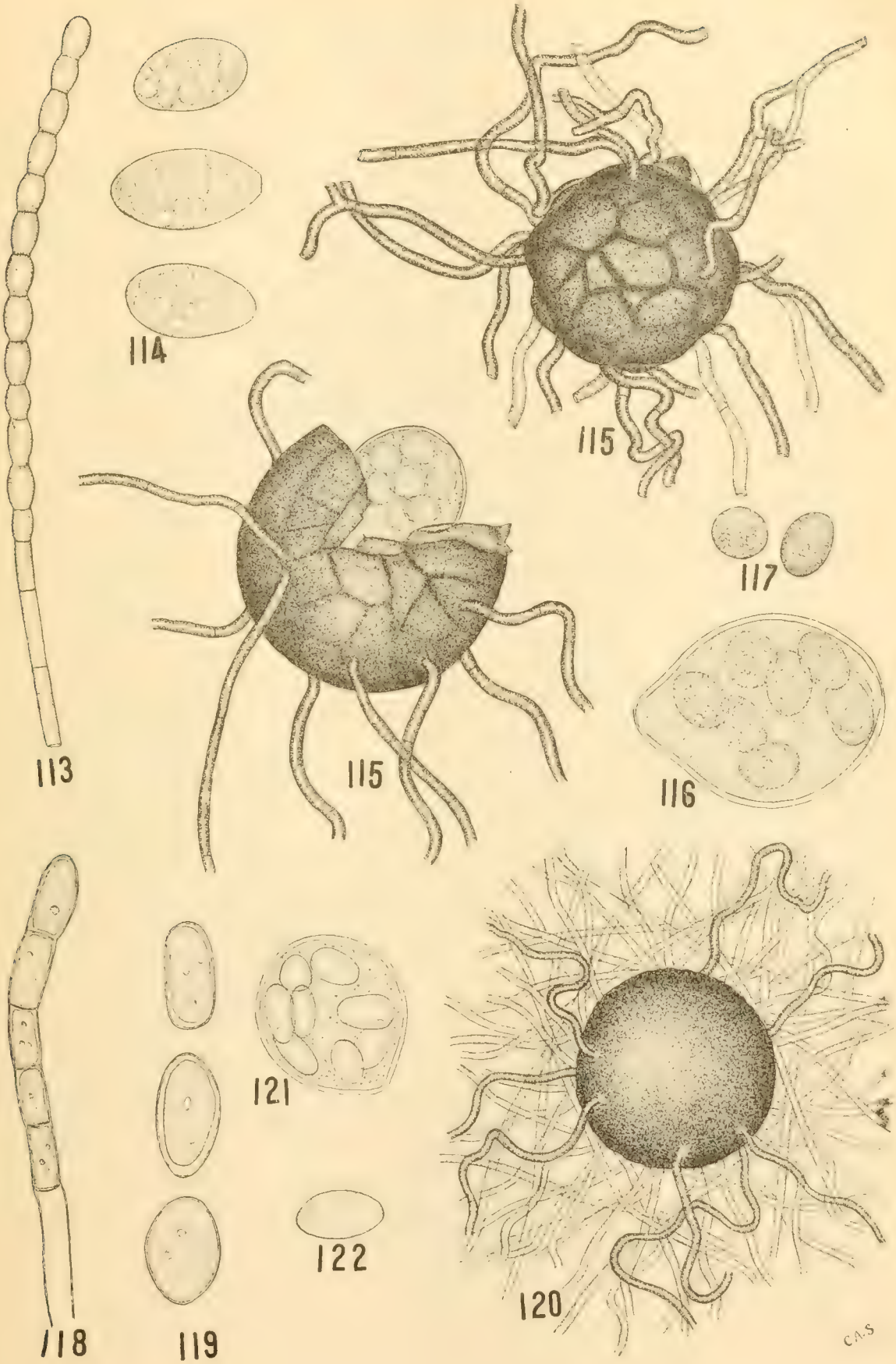
113. Conidiophore and spores, 1/6. 114. Conidia, 1/12. 115. Perithecia, 1/6. 116. Ascus, 1/12. 117. Ascopores, 1/12.

SPHÆROTHECA PANNOSA (Wal.) Lev. (= *Oidium leucoconium* Desm., page 116).—On the green parts of roses and peaches. Causes a stunting of young growths and prevents normal development of the flower. Affected parts are covered with a dense satiny growth of mycelium which is more persistent than *S. humili,* shiny white, finally becomes gray, buff or brownish. Conidia ovoid hyaline, 20-30 x 13-16 μ, and borne on short conidiophores. Perithecia surrounded by mass of mycelium. Appendages few, sometimes obsolete, very short tortuose, pale brown, septate globose to pyriform, and about 85-120 (usually 100) μ. Asci broadly-oblong to almost spherical, 88-115 μ, averaging 100 x 60-75 μ. Ascospores 20-27 x 12-15 μ. Conidia common on rose but perithecia are rare.

118. Conidiophores 1/6. 119. Spores, 1/12. 120. Perithecium, 1/6. 121. Ascus, 1/12. 122. Ascospore, 1/12.

UNCINULA NECATOR (Schw.) Burr. (= *Oidium tuckeri* Berk., page 116).—On the young leaves, young shoots and fruits of grape, ampelopsis, etc. Produces a luxuriant, persistent growth of mycelium. Conidia elliptic, oblong or obtusely rounded, hyaline, 25-30 x 15-17 μ. Perithecia on both leaves and fruit more or less scattered, 70-128 μ; appendages septate, 7 to 30 and rarely 40 in length;

*Also on strawberry, dandelion and other hosts.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asci 4 to 6 or sometimes 9, broadly-ovate, ovate-oblong or subglobose and without stalk, 5-60 x 30-40 μ; spores 4-7, 18-25 x 10-12 μ.

123. Perithecium, 1/6.

DIPLOCARPON ROSÆ Wolf. (= *Actinonema rosæ*,* page 84).

DIMEROSPORIUM COLLINSII (Schw.) Thüm.—On green parts of *Amelanchier canadensis* and *A. alnifolia*. Causes witches' brooms and forms a dense mass of brownish, black, septate mycelium on the under surface of the leaves, frequently concealing all but the midrib and most prominent veins. Conidiospores brown, more or less elliptical, 9-13 x 5-7 μ. Perithecia in masses on under surface of leaf, occasionally scattered on upper surface, black, globose, or polyhedral, with beak which falls away leaving circular ostiola, 150-190 μ; asci cylindric-clavate, 8-spored, 45-60 x 10 μ; ascospores hyaline to pale yellow, ovoid, unequally septate, the septum near the base of the spores, 12-15 x 3-5 μ.

124. Infected leaf of *Amelanchier canadensis* (under surface). 126. Conidiospores, 1/6, 1/12. 126. Conidiospores, 1/12. 127. Perithecia, 2/3. 128. Ascus, 1/12. 129. Ascospores, 1/12.

NECTRIA CINNABARINA (Tode) Fr. (= *Tubercularia vulgaris* Tode, page 144).—On woody parts of currants, mulberry, Norway maple and many other plants. Primarily a saprophyte but sometimes parasitic, causing cankers on woody parts and death. When parasitic the cankers always originate with a wound. Stroma breaks through the bark, the tubercularia stage pinkish, becoming yellowish-red and a dark red with age, 1-2 mm. high and broad; conidiophores in tubercular masses, each 50-100 μ long; conidia on short, lateral branches, elliptic, hyaline, 4-6 x 2 μ. Perithecia massed and frequently concealing the stroma, each perithecium nearly globose with prominent ostiolum, becoming slightly collapsed, cinnabar red, becoming darker with age, sometimes black, 374-400 μ; asci clavate, 50-90 x 7-12 μ, and 8-spored; spores mostly 2-septate, elliptical, elongate, 3 or 4 times as long as broad, obtuse ends, 1-septate, hyaline, usually slightly curved, 12-20 x 4-6 μ. Paraphyses delicate.

130. Conidia (Tubercularia stage), 1/12. 131. Cross-section through stroma and perithecia. 132. Ascus, 1/12. 133. Ascospores, 1/12.

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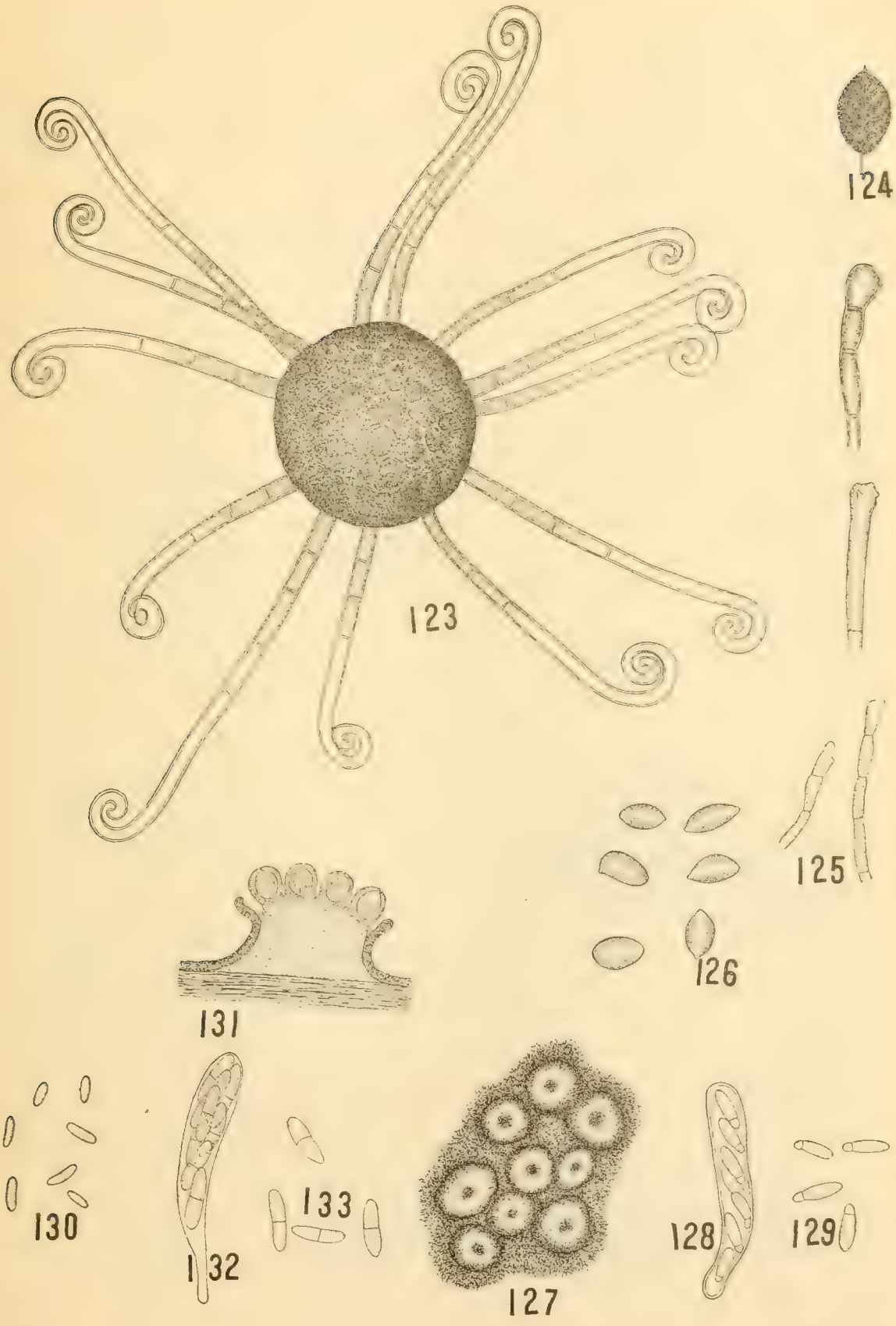
*Syn. *Marssonina rosæ* (Lib.) Trail—Ann. Mycol. v. 10, p. 146 (1912).

*Referred to genus *Apiosporina* by v. Hoehnel (Fragm. zur Mykol., No. 506).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NECTRIA IPOMOEÆ Hals.—On sweet potatoes. Causes a storage rot but is saprophytic rather than parasitic. Conidia (*Fusarium* sp.) falcate 1 to 6-celled; perithecia in tufts, globose or somewhat conical, red; asci clavate, 8-spored; spores elliptical, 1-septate, slightly constricted, hyaline. The ascigerous stage was produced from single conidiospore culture.

134. Mycelium, conidiophores and spores 1/6. 135. Conidia, 1/12. 136. Various formations of chlamydospores, 1/6, 1/12. 137. Germinating chlamydospores, 1/12. 138. Immature perithecium, 2/3. 139. More advanced stage of same, 2/3. 140. Tip of mature perithecium, 1/6. 141. Asci, 2/3. 142. Same, 1/6. 143. Ascospores, 1/6. 144. Germinating ascospores, 1/6.

CHROMOCREA CERAMICA (E. & E.) Seaver.—On *Ganoderma tsugæ*. Seaver (Mycologia, v. 2, p. 59, 1910) describes it as follows:

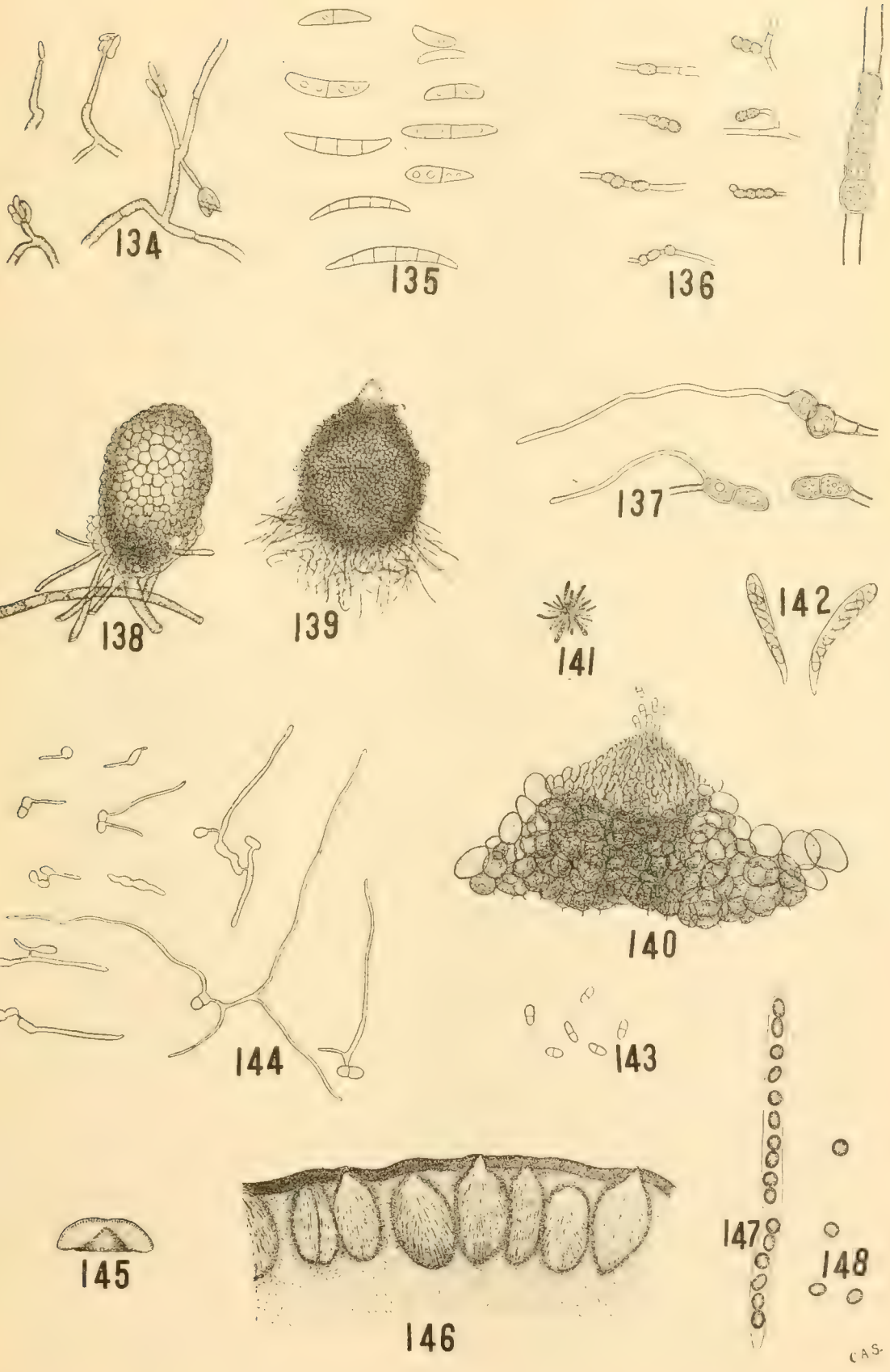
"Stromata appearing first as a speck of white tomentum, with a brick-red spot appearing in the center, finally becoming fleshy, rather thick and entirely brick-red without, and white within, subpatellate, convex, becoming wrinkled when dry, punctuate with the necks of the slightly protruding perithecia finally dusted over with the greenish spores; asci cylindrical, becoming 16-spored by the breaking of each original spore into 2 subglobose cells; spores about 4 μ in diameter, the lower of each pair a little larger than the upper."

This description from material growing on decaying limb of *Juniperus*. Our specimen was without doubt parasitic. The fungus determined by Dr. F. J. Seaver and the host by Dr. W. A. Murrill.

145. Cross-section of stroma, 2/3. 146. Same, 1/6. 147. Ascus, 1/12. 148. Ascospores, 1/12.

BALANSIA HYPOXYLON (Pk.) Atk. — On the grasses. Seaver (Mycologia, v. 3, p. 223, 1911) describes this species as follows: "Sclerotia formed in the fruiting axis of the host, curved and irregular, 1 cm. or more in length, grayish or blackish; stromata black, prominent, pulvinate or subhemispheric, 1-5 mm. in diameter, several springing from the same sclerotium minutely roughened by the slightly protruding perithecia, perithecia immersed; asci cylindric, with a pedicel at the base, as much as 20 μ in length; spores 1 mic thick at maturity breaking into segments 3-4 μ long.

149. Infected grass. 150. Cross-section of stroma, 2/3. 151. Same, 1/6. 152. Ascus containing spores, 1/12.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TYPHODIUM TYPHINUM (Pers.) Seaver.—On grasses. Prevents flowering. Seaver (Mycologia, v. 2, p. 86, 1910) describes this species as follows: "Stroma effused, subfleshy, at first pale, becoming bright orange, forming sheaths 2-5 cm. in length, about the stems of various grasses; conidia elliptical, hyaline, 4-5 x 3 μ; perithecia thickly scattered, partially to entirely immersed, soft membranaceous, similar in color to the stroma, with rather prominent ostiolum; asci cylindrical, very long, 8-spored; spores nearly as long as the ascus, in a close fascicle, about 2 μ in diameter, many septate."

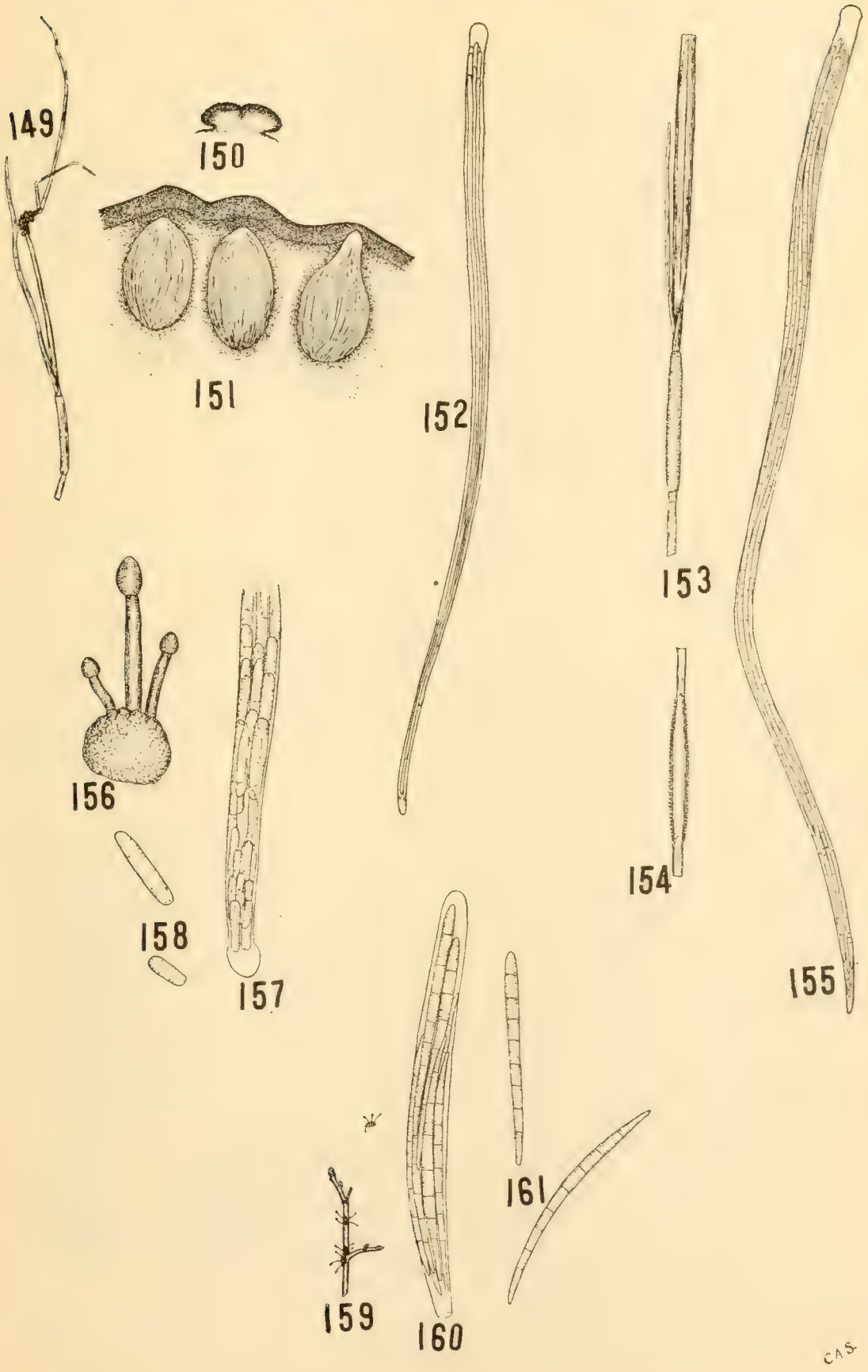
153. Infected grass. 154. Longitudinal section of same through stroma. 155. Ascus containing spores, 1/12.

CORDYCEPS AGARICIFORMIA (Bolt.) Seaver. — On Elaphomyces. Seaver (Mycologia, v. 3, p. 217, 1911) describes this species as follows: "Stromata occurring singly or in clusters of several each, 3-8 cm. high, consisting of a sterile stem and an ovoid or capitate, fertile head, stem uniform in thickness or a little thicker below, fibrous yellowish, becoming nearly black (in dried specimens), smooth head ovoid agariciform, about 1 cm. in diameter, reddish brown becoming nearly black, roughened by the slightly protruding necks of the perithica, perithecia immersed, but prominent, asci very long, cylindric, about 15 μ thick, spores, filiform, nearly as long as the ascus, finally breaking into segments, subhyaline, fusoid or oblong ellipsoid, with the ends rounded, 20-40 x 4-5 μ."

156. Mature plant parasitic on another fungus. 157. Part of ascus, 1/12. 158. Ascospores, 1/12.

CORDYCEPS CLAVULATA Schw.—On the dead scale insects. Seaver (Mycologia, v. 3, p. 314, 1911) describes this species as follows: "Sclerotia formed in the bodies of dead scale insects; stromata slender, clavate, at first sterile, at maturity with an enlarged clavate fertile head and a slender, sterile stem, the whole 3-4 mm. high, 3-8 springing from a single sclerotium; stem slender, 1-2 mm. long, grayish cinereous, head thicker, darker in color and strongly roughened by the protruding necks of the perithecia; asci clavate, broader near the middle, 8-100 x 8-10 μ; spores much elongate, subfiliform, broader near the base and tapering toward either end, 7-8 septate about 50-80 μ long, 3 μ thick at the broadest point, hyaline."

159. Twig bearing infected scale insects. 160. Ascus, 1/12. 161. Ascospores, 1/12.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CORDYCEPS MILITARIS (L.) Link.—On buried or partially buried insect pupa. Seaver (Mycologia, v. 3, p. 209, 1911) describes this species as follows: "Sclerotia formed in the pupæ of insects, compact, white, conidial stage (Isaria) rising from the sclerotium, consisting of a slender stalk, and a white, floccose, feather-like head; stromata at maturity consisting of a sterile stem and fertile, clavate head, usually a simple but more rarely forked or branched, the whole often attaining a height of 4-5 cm. but often much shorter, bright-orange; perithecia thickly scattered or crowded, for the most part with the necks protruding, or superficial (especially in weathered specimens); asci cylindric; spores filiform, nearly as long as the ascus, many-septate, breaking apart at the septa, giving rise to numerous subellipsoid segments 2-3 μ long."

162. Infected larva and mature plant. 163. Part of ascus containing spore, 1/12.

CORDYCEPS SPHINGUM (Schw.) B. & C.—On dead insect larvæ within the cocoon. Seaver (Mycologia, v. 3, p. 216, 1911) describes this as follows: "Stromata numerous, as many as thirty often springing from a single sclerotium, very slender and thread-like, about 5 cm. high and 1 mm. in thickness, cinerous, smooth or slightly pruinose, enlarged at the base, more or less bent above; perithecia subsuperficial, subconic 25-150 x 200-225 μ, brownish, asci elongate, cylindric; spores filiform, as long as the ascus, about 2 μ thick."

164. Infected larva in cocoon and mature plant. 165. Ascus containing spores, 1/12.

PLOWRIGHTIA MORBOSA (Schw.) Sacc. — On the stems of plums and cherries. Causes black, unsightly, wart-like enlargements of the affected parts and frequently results in death. The young knots are formed in the spring and are greenish and bear the conidiophores and conidia (*Cladosporium*). The conidiophores are erect, simple, septate and 40-60 x 4-5 μ; the conidia are light brown, obovate, unicellular and about 6-8 x 2-5 μ. The mature knots are black, tubercular, conspicuous, extremely variable in size, the perithecia are formed late in the summer or early winter, scattered, sometimes suppressed; asci about 120 μ in length, containing 8 spores which are obliquely uniseriate, and 16-20 x 8-1 μ; paraphyses present. (See Ann. Mycol., v. 13, p. 663, 1915.)

166. Infected cherry twigs showing conidiophore stage. 167. Conidiophores and spores, 1/12. 168. Infected cherry twig in advanced stage. 169. Cross-section of stroma showing perithecia. 170. Asci and ascospores, 1/12.

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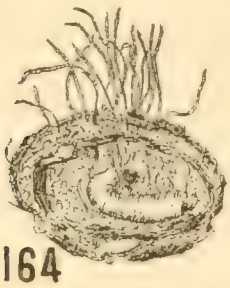

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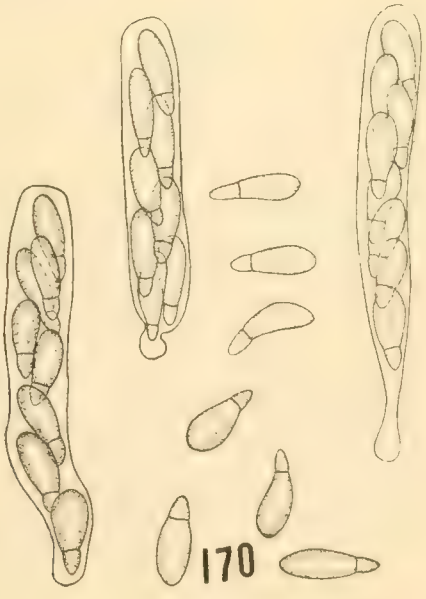

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PHYLLACHORA GRAMINIS (Pers.) Fcl.—On leaves of grasses and sedges. Stroma variable in size but causing small, conspicuous black spots. Conidia unknown. Perithecia immersed and ostiolate; asci cylindric and with short pedicles, 70-80 x 7-8 μ; ascospores, hyaline, ovoid, obliquely uniseriate, 8-12 x 4-5 μ; paraphyses filiform.

171. Infected blade of grass. 172. Cross-section of stroma showing perithecia, 2/3. 173. Ascus. 174. Ascospores, 1/12.

PHYLLACHORA TRIFOLII (Pers.) Fcl. (= *Polythrincium trifolii* Kze., page 122).—On the leaves of clovers. Causes small black spots of 1 mm. or less. Conidiophores (*Polythrincium trifolii*) wavy, erect, simple and black; conidia obovate, 1-septate slightly constricted, pale, olivaceous, 20-24 x 9-10 μ; ascospore stage rare; asci 8-10 x 5-6 μ.

175. Infected clover leaf. 176. Conidiophores and conidia, 1/12. 177. Conidia, 1/12.

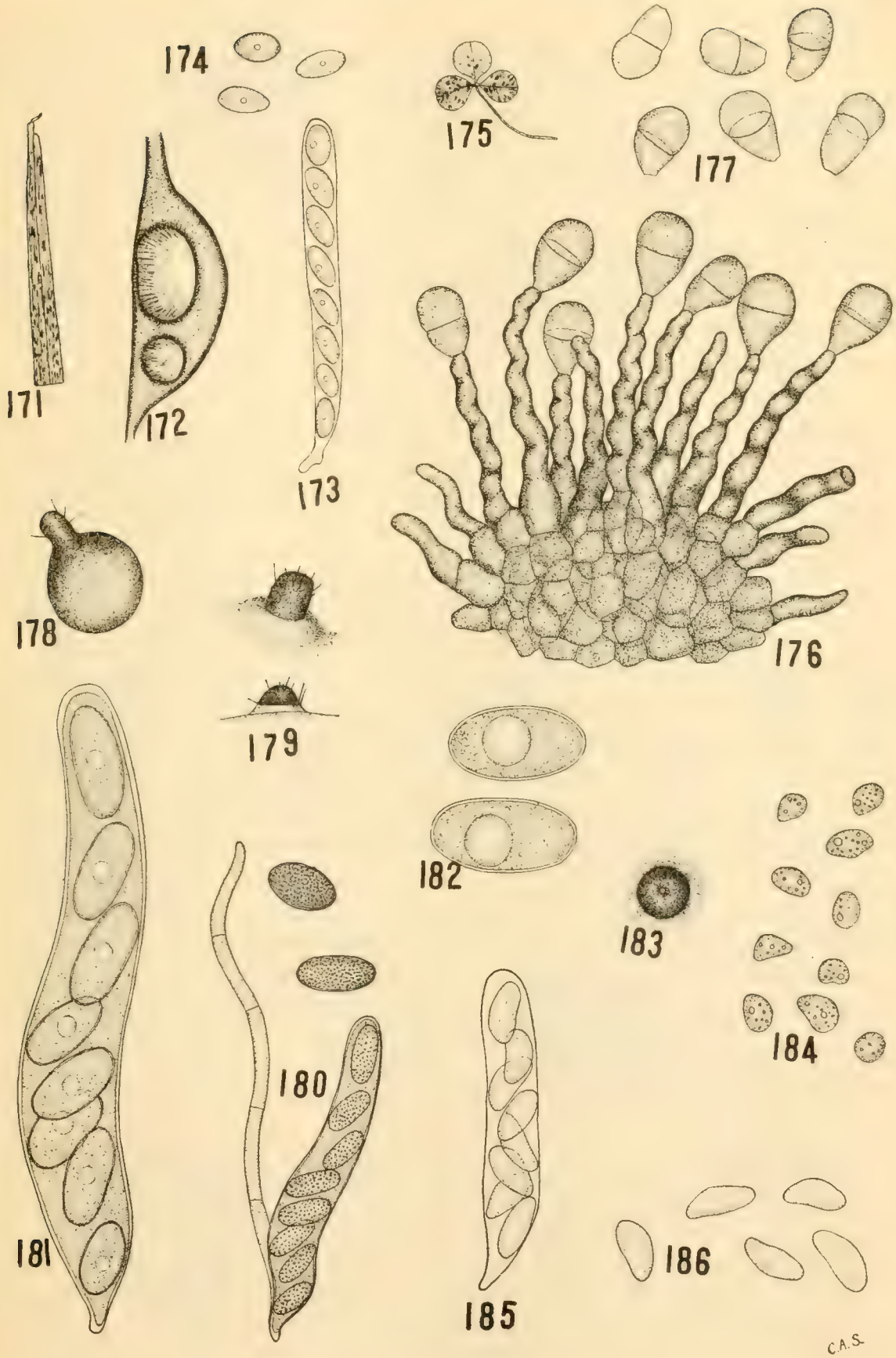
ACANTHORYNCHUS VACCINII Shear. — On the cranberry. Mycelium in leaves and fruit without necessarily producing a rot. Rot frequently appearing after putting fruit in storage. Rot light brown to chocolate-colored, more solid than the scald rot. Perithecia scattered on decaying leaves, never on green leaves, rarely found on fruit, subglobose to flask-shaped, 120-200 μ in diameter, submembraneous, the stout neck projecting and more or less covered with spines measuring 50-70 x 8-9 μ; asci subelliptic to clavate, pale, brownish-yellow, surrounded by a mucilaginous layer of protoplasm, 24-32 x 12-18 μ.

178. Perithecium from culture, 2/3. 179. Tips of perithecia, 2/3. 180. Immature ascus, ascospores and paraphyses, 1/6. 181. Mature ascus, 1/12. 182. Mature ascospores, 1/12.

GUIGNARDIA ÆSCULI* (Pk.) Stewart (= *Phyllosticta paviæ* Desm., page 68).—On the leaves and sometimes on the immature fruits of horse-chestnut (*Aesculus hippocastanum*) and the buckeye (*Ae. glabra*). Causes large, irregular dry brown or dark red blotches with indefinite yellow borders. Pycnidia globose, black, 90-175 μ; conidia oval 10-16 x 6.5-10 μ; spermagonia with minute hyaline spores; asci clavate 54-70 x 15-17 μ or larger when wet; ascospores subelliptical, uninucleate, granular, 12-18 x 7-9 μ.

183. Pycnidium, 2/3. 184. Conidia, 1/12. 185. Ascus, 1/12. 186. Ascospores, 1/12.

*Syn. *Læstadia æsculi.*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GUIGNARDIA BIDWELLI (E.) V. & R. — On berries, leaves and stem of grapes. Causes rotting of the fruit, spots on leaves, stems and tendrils. The conidia (*Phyllosticta labruscæ* Thüm., page 66) on leaves (*Phoma uvicola,* page 72), on stems and tendrils, borne in numerous black, papillæ-like pycnidia 180 x 180 μ, subepidermal, elliptic, thick-walled; conidiophores, short, simple; conidia ovate to elliptic 8-10 x 7-8 μ. Filiform microconidia ("spermatic") in flask-shaped pycnidia, 0.1-0.2 x 0.45-0.46 μ. The perithecia develop on the old berries, are minute, globose, subepidermal, erumpent and perforate; the asci clavate-cylindrical, obtuse, 60-70 x 10-13 μ; spores spindle-shaped, 12-17 x 4.5-5 μ.

This very destructive rot disease appears on fruit when the berries are about two-thirds grown as well-defined circular purplish or brown spots which gradually spread. The rotten berries dry and become wrinkled. Appear very much like *Melanconium fuliginium* (page 110).

187. Infected grapes. 188. Pycnidium, 2/3. 189. Large and small pycnidiospores, 1/12. 190. Ascus, 1/12. 191. Ascospores, 1/12.

GUIGNARDIA VACCINII Shear.—On the leaves, flowers and fruits of the cranberry; causing a rotting of the fruits and a spotting of the leaves. The conidia (*Phyllosticta* stage) formed in pycnidia, 100-120 μ; conidia hyaline, obvoid, 10.5-13.5 x 5-6 μ. The perithecia on the young fruits or flowers are subepidermal globose, and with thick walls; asci clavate, cylindrical, short stipitate, 60-80 μ and 8-spored; ascospores hyaline and spindle-shaped. No paraphyses.

192. Infected berries. 193. Pycnospores, 1/12. 194. Pycnospores with appendages, 1/12. 195. Asci in various stages of development, 1/12. 196. Ascospore, 1/12.

MYCOSPHÆRELLA FRAGARIÆ (Tul.) Lin. (= *Ramularia tulasnei* Sacc., page 120).

MYCOSPHÆRELLA LETHALIS Stone (= *Ascochyta lethalis* E. & E., page 82).

MYCOSPHÆRELLA ROSIGENA E. & E. — On the leaves of the rose. Causes reddish-brown, purple-bordered spots about 3 mm. in diameter; perithecia abundant, minute, 60-75 μ, partly erumpent, black; asci subclavate to oblong, 25-30 x 8-10 μ; spores bi-seriate, clavate-oblong, end subacute, hyaline, 1-septate, 10-12 x 2 μ.

197. Infected leaf of rose. 198. Perithecia, 2/3. 199. Ostiolum of perithecium, 1/6. 200. Asci in various stages. 201. Ascospores, 1/12.

MYCOSPHÆRELLA PINOIDES B. & B. (= *Ascochyta pisi* Lib., page 82).

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MYCOSPHÆRELLA SENTINA (Fr.) Schr. (= *Septoria piricola* Desm., page 92).—On the leaves of pear and apple. In conidial stage causes angular spots of various sizes (depending on host) with ashy-gray centers surrounded by brown or black zone and sometimes an outer purple zone. These color zones are frequently lost in older leaves. Pycnidia ovate, minute, black, on both surfaces of ashy-gray centers; conidiophores hyaline, conidia filiform, usually curved, 2-septate 40-60 x 3-4 μ. Perithecia crowded, black, numerous, on under side of dead spots of over-wintered leaves, long ostiole, erumpent, 80-110 μ; asci colorless, clavate, frequently slightly curved, base variable in form, 60-75 x 11-13 μ; ascospores fusiform, straight or very slightly curved, 1-septate, cells equal, 26-33 x 4 μ.

202. Infected leaf of pear. 203. Conidia, 1/12. 204. Perithecia, 1/12. 205. Asci, 1/12. 206. Ascospores, 1/12.

PLEOSPORA HYALOSPORA E. & E. — On the leaves of alfalfa.* Causes brown to whitish, oblong or marginal leaf spots. Perithecia scattered, depressed, hemispherical, papilliform ostiolum erumpent, 75-90 μ. Asci oblong, 75-85 x 35-40 μ. Ascospores oblong to ovate, ends rounded, 3-6 sptate with one or more longitudinal septa, slightly constricted at septa, 25-41 x 12-20 μ.

NOTE:—It is well known that Alternaria is sometimes the conidial stage of the species of this genus. We found an Alternaria constantly associated with this species, but did not prove its connection by culture and inoculation.

207. Infected leaves of alfalfa. 208. Ascus, 1/12. 209. Ascospores, 1/12. 210. Germinating ascospores, 1/12. 211. Perithecium, 1/6. 212. Cross-section of leaflet showing Alternaria associated with Pleospora, 2/3. 213. Conidiophores of same, 1/12. 214. Conidium of same, 1/12. 215. Germinating spore of same, 1/12.

PHYSALOSPORA CYDONIÆ Arnaud.—The perfect stage of *Sphæropsis malorum*, page 78.

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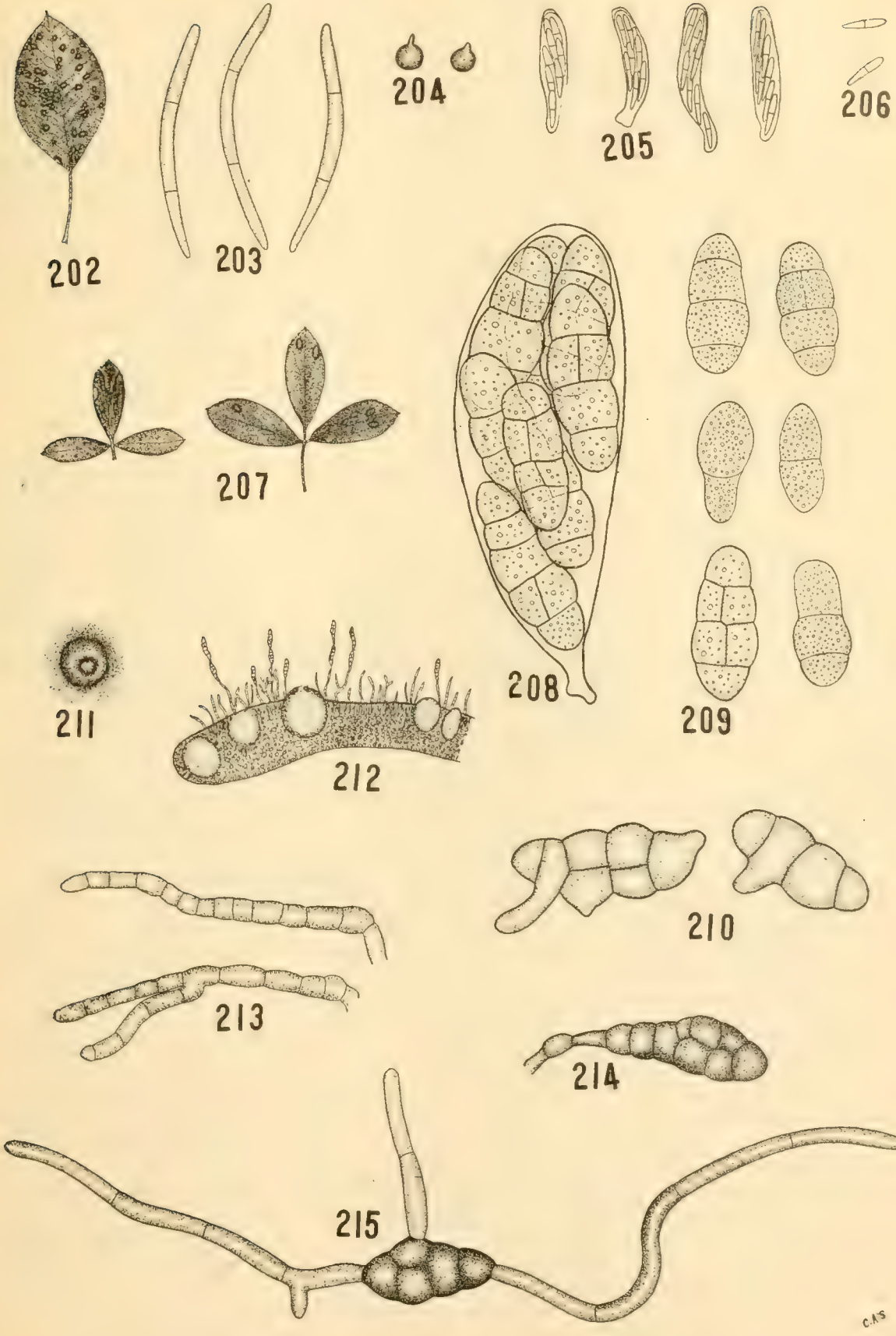
*Apparently the same as *P. hyalospora* reported on *Lathyrus sativus* and *Pisum sativum*.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VENTURIA INÆQUALIS (Cke.) Aderh. (= *Fusicladium dendriticum* (Wal.) Fcl., page 122).—On fruits, twigs and leaves of the apple. Causes spotting and cracking of the fruit and a velvety growth on twigs and under side of leaves. The conidial stage produces blackish-olive velvety patches (sometimes covering the entire lower surface and sometimes on upper surface of leaves and on twigs and fruit), of erect, closely septate brown, mycelium; conidiophores closely non-septate or 1-septate, wavy or nodulose brown, 50-60 x 4-6 μ; conidia single, terminal, obclavate, but sometimes irregular in shape, yellowish olive, 30 x 7-9 μ; perithecia maturing in the spring on the old leaves, globose, short-necked, smooth or bristled above, 20-160 μ; asci cylindric, 40-70 μ long; the ascospores yellowish-green, unequally 2-celled, the upper cell shorter and broader, 11-15 x 4-8 μ.

216. Infected apple leaf. 217. Infected apple. 218. Mycelium from culture, 1/12. 219. Conidiophores and conidia from culture, 1/6, 1/12. 220. Conidia from fruit, 1/12. 221. Infected apple twigs (conidial stage) collected in early spring. 222. Cross-section of same, 2/3. 223. Conidiophores and conidia from same, 1/12. 224. Asci, 1/12. 225. Ascospores, 1/12.

VENTURIA GAULTHERIÆ E. & E.—On the leaves of *Gaultheria procumbens*. Causes orbicular or irregular dark brown spots with grayish centers, 1/3 mm. in diameter. Perithecia scattered, orbicular, membranous, 75 μ in diameter, with few black spreading bristles; asci ovate to oblong, slightly curved, 30-35 x 8-11 μ; conidia ovate to oblong, septate, slightly constricted, 3-4 guttulate, slightly curved, hyaline, 11-14 x 3 μ.

226. Infected leaf of *Gaultheria procumbens*. 227. Perithecia, 2/3. 228. Asci and ascospores, 1/12.

VENTURA PIRINA Adler (= *Fusicladium pirinum* (Lib.) Fcl., page 122).

LEPTOSPHÆRIA CONIOTHYRIUM (Fcl.) Sacc. (= *Coniothyrium fuckelii* Sacc., page 80).

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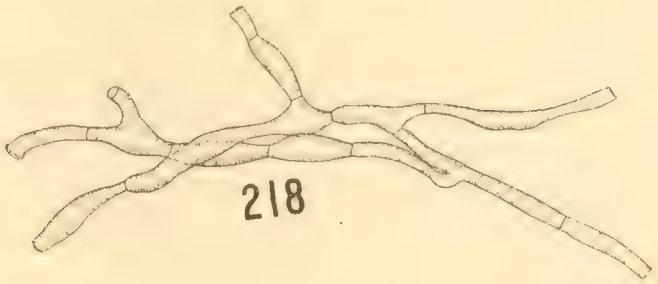
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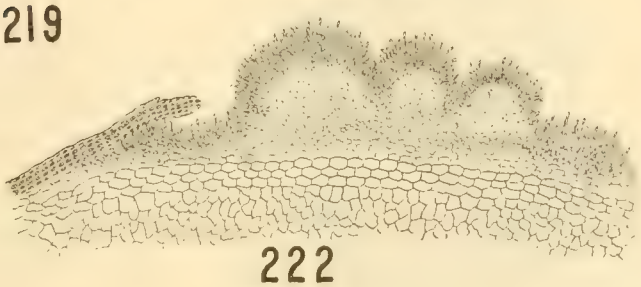
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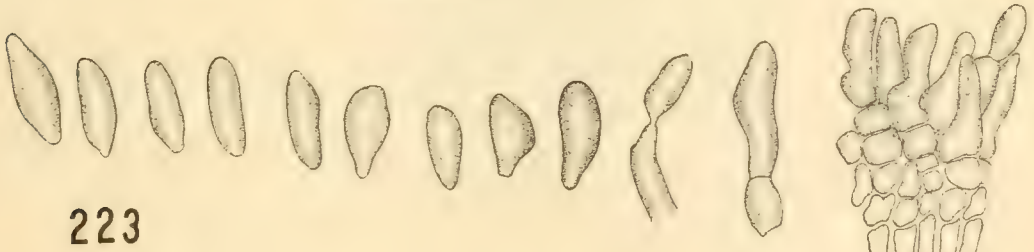
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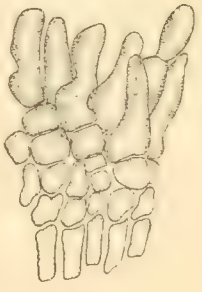
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CAS

GLOMERELLA RUFOMACULANS (Berk.) S. & S. (= *Gloeosporium rufomaculans* (Berk.) Thüm., page 102. — On the fruits and twigs of the apple. Causes a rotting of the former and cankers on the latter. The fruit rot originates as small, yellowish-brown spots usually with a purplish-red border; the spots enlarge, becoming dark brown in center with light brown margins and gradually become more or less sunken; the twig or branch cankers are circular or oblong, somewhat sunken, dry and more or less cracked.

The acervuli (*Glœosporium fructigenum, G. rufomaculans*) arranged in circles and discharge an abundance of sticky, pink spores, spores are variable in size and shape, 28 x 3.5-7 μ.

The perithecia are subspherical, more or less grouped, asci subclavate, 55-70 μ; ascospores 12-22 x 3-5 μ.

229. Infected apple. 230. Conidia from fruit, 1/12. 231. Conidia from culture, 1/12. 232. Perithecium, 2/3, 1/6. 233. Ascus, 1/11. 234. Ascospores from same, 1/12.

GLOMERELLA RUFOMACULANS VACCINII Shear. — On the upper surface of leaf and on fruit of the cranberry, causing the anthracnose disease. Acervuli small, scattered over both leaves and old berries; conidiophores non-septate, tapering, 15 to 20 μ long; conidia light flesh-colored in mass, oblong to elliptical, sometimes slightly smaller at one end, hyaline, 12-18 x 4.5-6 μ; perithecia membranous, subglobose or slightly pear-shaped; asci clavate, sessile or short stipitate, 60-72 x 10-12 μ; sometimes accompanied by apparently evanescent paraphyses; sometimes slightly unequilateral or curved hyaline becoming pale green-yellow, 9-18 x 5-7.5 μ.

235. Mycelium, 1/6. 236. Bristle, conidiophores and conidia, 2/3. 237. Conidia, 1/12. 238. Ascus and ascospores, 1/12.

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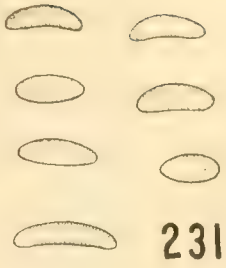
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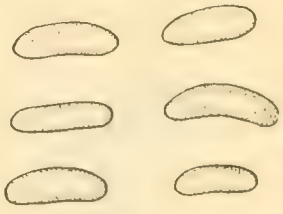
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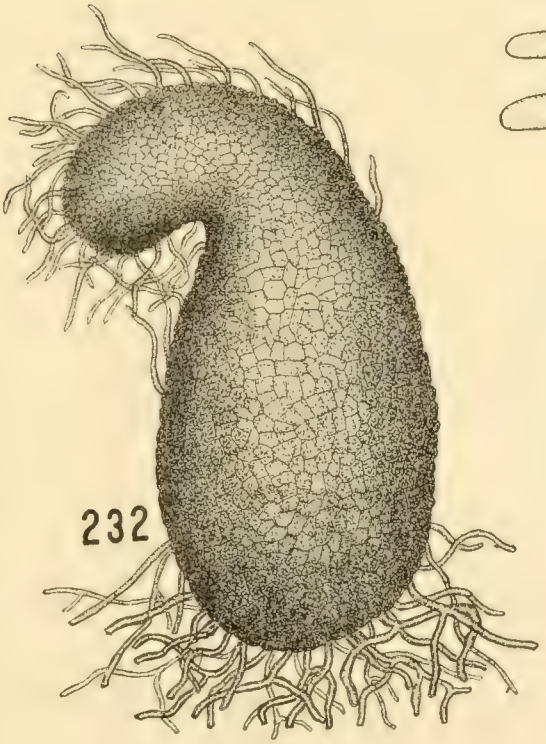
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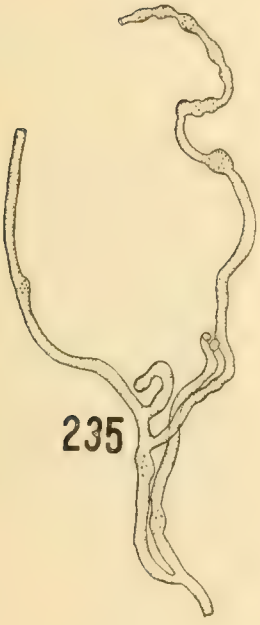
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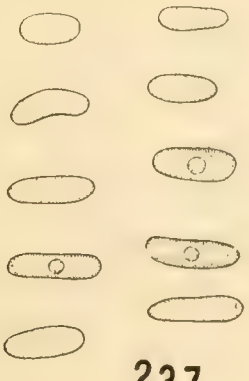
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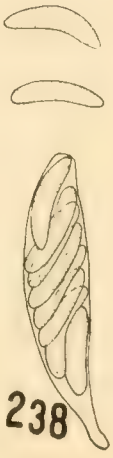
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GLOMERELLA RUBICOLA (Ston.) S. & S.—On the petioles and on canes of raspberry at point of union of petiole and cane. Causes a spur blight and falling of the leaves. Acervuli most abundant at point of union of petiole and cane; conidiospores (= *Colletotrichum rubicolum* E. & E., page 108)) oblong or elliptical, salmon-colored to dark brown, 11-12 x 3-4 μ; perithecia in same location as acervuli, with prominent neck, ascus long with short base, and slightly pointed at tip; ascospores long, rounded at the ends, and slightly curved.

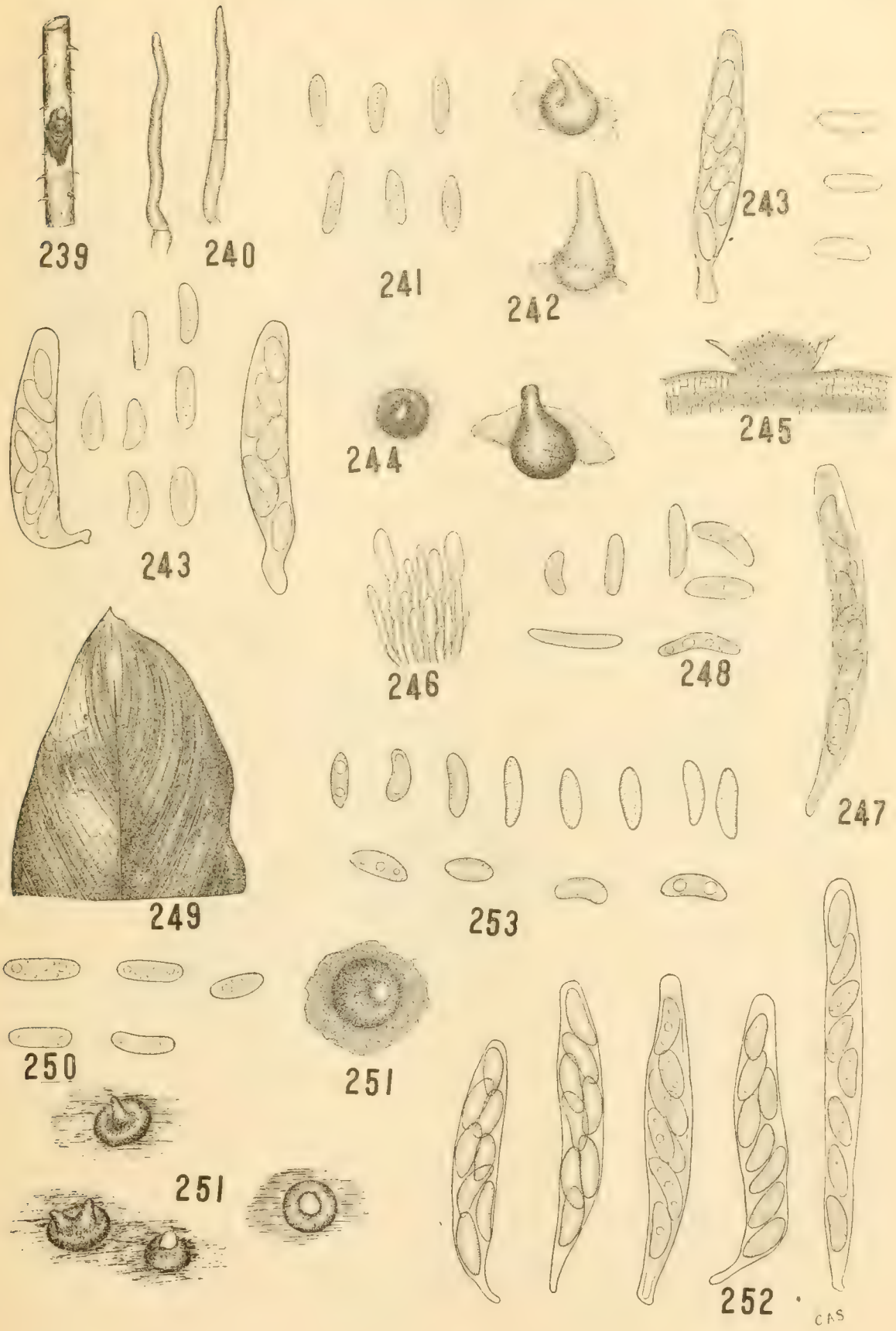
239. Infected raspberry cane. 240. Bristles, 1/12. 241. Conidia, 1/12. 242. Perithecia, 2/3, mostly from petioles. 243. Asci and ascospores, 1/12, from two sources.

GLOMERELLA CINGULATA (Atk.) S. & S.—On *Ficus elastica.* Causes a dying of the leaves (*Glœosporium cingulatum,* page 98), acervuli black, 100-150 μ; conidiophores numerous, crowded, nonseptate, hyaline; conidia, oblong to elliptical, straight or curved, pointed at one end, 10-20 x 5-7 μ; perithecia in groups, dark brown, flask-shaped, membranous, more or less hairy, 250-320 x 150 μ; asci clavate, 64 x 16 μ; ascospores elliptical, slightly curved. 20-28 x 5-7 μ.

244. Perithecia, 2/3. 245. Cross-section of acervulus, 2/3. 246. Conidiophores and conidia, 1/12. 247. Asci, 1/12. 248. Ascospores, 1/12.

GLOMERELLA CINCTA (B. & C.) S. & S. — On *Calathea vitata.* Causes large, irregular yellow to brown spots on the leaves (*Colletotrichum cinctum,* page 104). Acervuli erumpent; conidia elliptical; 12-18 x 3-5 μ; perithecia flask-shaped, membranous, in groups, 180-280 μ; asci clavate, truncate or obtuse, 65-70 μ; ascospores elliptical; usually curved, 16.5-24 x 3.3-6.6 μ.

249. On infected leaf of *Calathea vitata.* 250. Conidia, 1/12. 251. Perithecia, 2/3, 1/6. 252. Asci, 1/12. 253. Ascospores, 1/12.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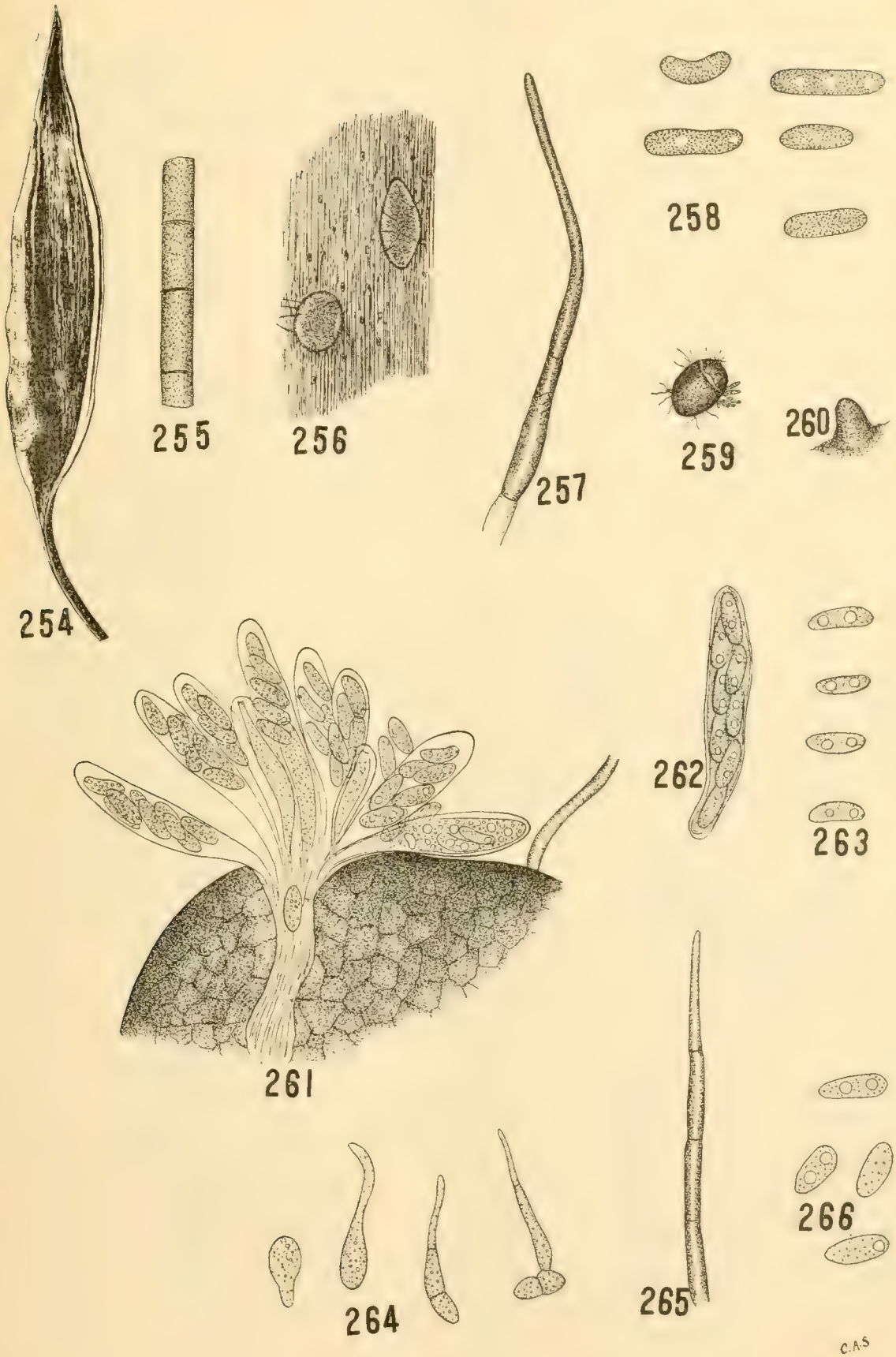
—On leaves of *Dracaena sanderiana* and *D. terminalis*. Causes a spotting and dying of the leaves (probably = *Colletotrichum dracaenae* Allesch). Acervuli on both sides of the leaves and also on canes, scattered or grouped, flesh-colored becoming black; bristles dark brown, 40-100 x 2.5-5 μ; conidiospores crowded, short hyaline; usually straight; ends usually rounded, hyaline, 13-30 x 3.5 μ; ascospores 13.3-20 x 3.3-6.6 μ.

254. Infected leaf of *Dracaena sanderiana*. 255. Infected cane showing acervuli. 256. Acervuli on leaf, 2/3. 257. Bristle from cane, 1/12. 258. Conidia, 1/12. 259. Perithecium, 2/3. 260. Tip of perithecium, 2/3. 261. Rupturing of perithecium, 1/12. 262. Ascus, 1/12. 263. Ascospores, 1/12. 264. Germinating spores, 1/12. 265. Bristle from *D. terminalis*, 1/12. 266. Conidia from same, 1/12.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On *Curmeria wallisi.* Causes a spotting and a dying of the leaves; conidiospores 13.3-20 x 3.3-6.6 μ; ascospores 13-20 x 6.6 μ.

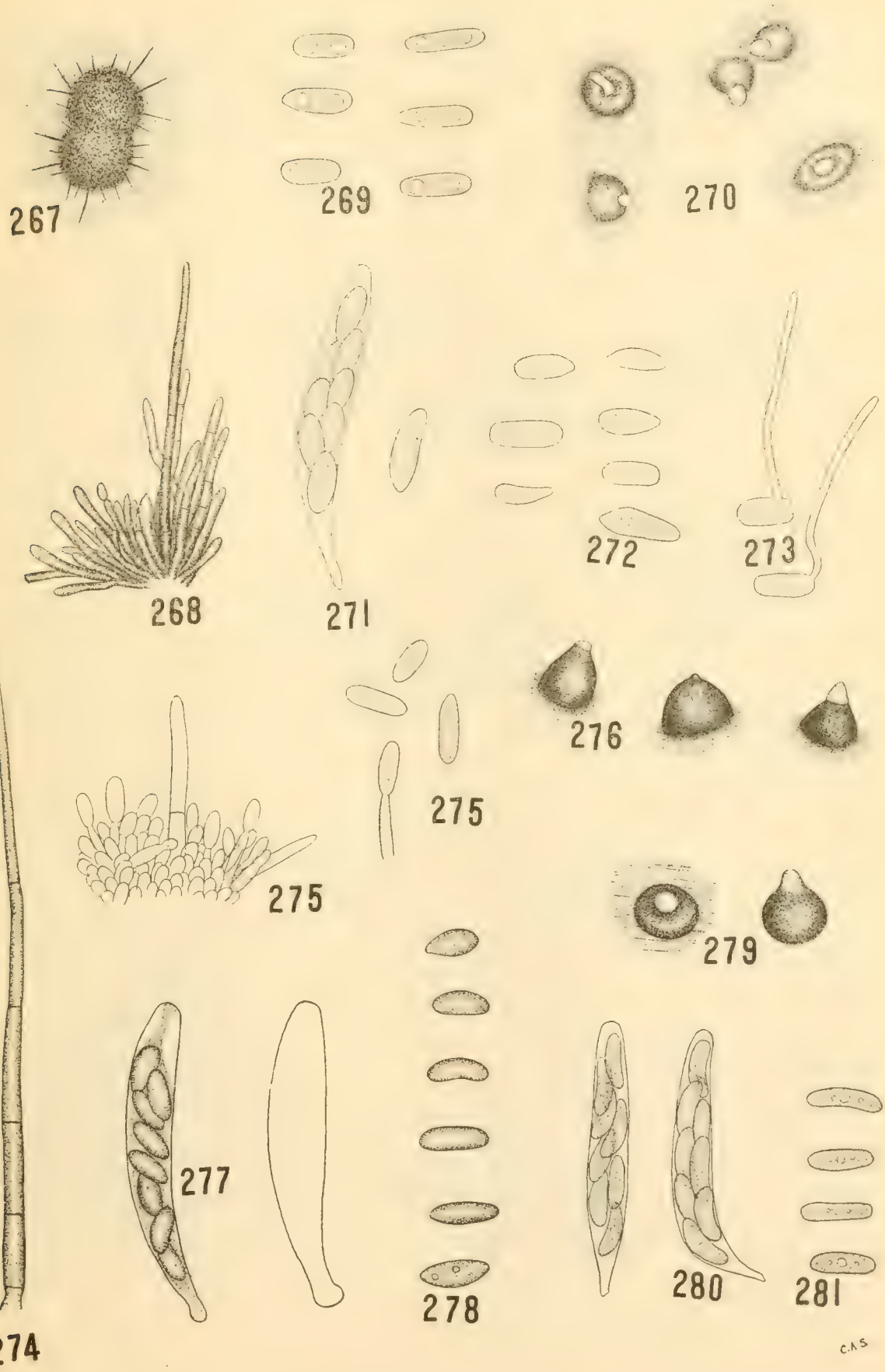
267. Acervuli, 2/3. 268. Bristle and conidiophores, 1/6. 269. Conidia, 1/12. 270. Perithecia, 2/3. 271. Ascus, 1/12. 272. Ascospores, 1/12. 273. Germinating ascospores, 1/12.

On the living leaves of Begonia. Causes reddish-brown spots; acervuli on upper surface of leaf, somewhat rounded, scattered; conidiospores cylindrical, non-septate, hyaline or base slightly smoky-colored, 12-14 μ; conidiospores oblong to elliptical, ends usually rounded, hyaline, 16-17 x 4-5 μ; (given in Saccardo as *Glœosporium begoniæ* Mag., but we found bristles); perithecia conical; ascospores 10-16.6 x 3.3-6.6 μ.

274. Bristle, 1/12. 275. Conidiophores and conidia, 1/12. 276. Perithecia, 2/3. 277. Asci, 1/12. 278. Ascospores, 1/12.

On the leaves of *Cocos plumosa.* Causes a spotting; perithecia flask-shaped; ascospores 15-61.6 x 5-6.6 μ.

279. Perithecia, 2/3. 280. Asci, 1/12. 281. Ascospores, 1/12.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On the stems of roses. A weak parasite attacking weak plants and causing a dying of the infected parts. Acervuli scattered; conidiophores 3.3 μ wide; spores hyaline but salmon-colored or pinkish in mass, guttulate, 18-21.6 x 6-7.3 μ (= *Glœosporium roseæ* Hals.). Ascogenous stage corresponding to the preceding.

282. Perithecia, 2/3. 283. Conidiophores and conidia, 1/12, from two sources. 284. Asci, 1/12.

GLOMERELLA CINCTA (B. & C.) S. & S. (= *Glœosporium polymorphum* Tunchili, page 100).

GLOMERELLA FUSARIOIDES Edgerton (= *Glœosporium fusarioides* E. & E., page 100).

GLOMERELLA PIPERATA (E. & E.) S. & S. (= *Glœosporium piperatum* E. & E., page 100).

GNOMONIA ANDROPOGONIS E. & E.—On the leaves of *Andropogon.* Perithecia buried in the tissue of the leaf, subglobose, collapsing from below, membranaceous, black, 5 mm. in diameter, beak sublateral and erumpent, cylindrical, oblong-lanceolate, 40 x 10 μ; no paraphyses; spores crowded, cylindrical to fusoid, septate, each cell 1-2 guttulate, slightly curved, hyaline, 20-25 x 4 μ.

285. Perithecia, 2/3.

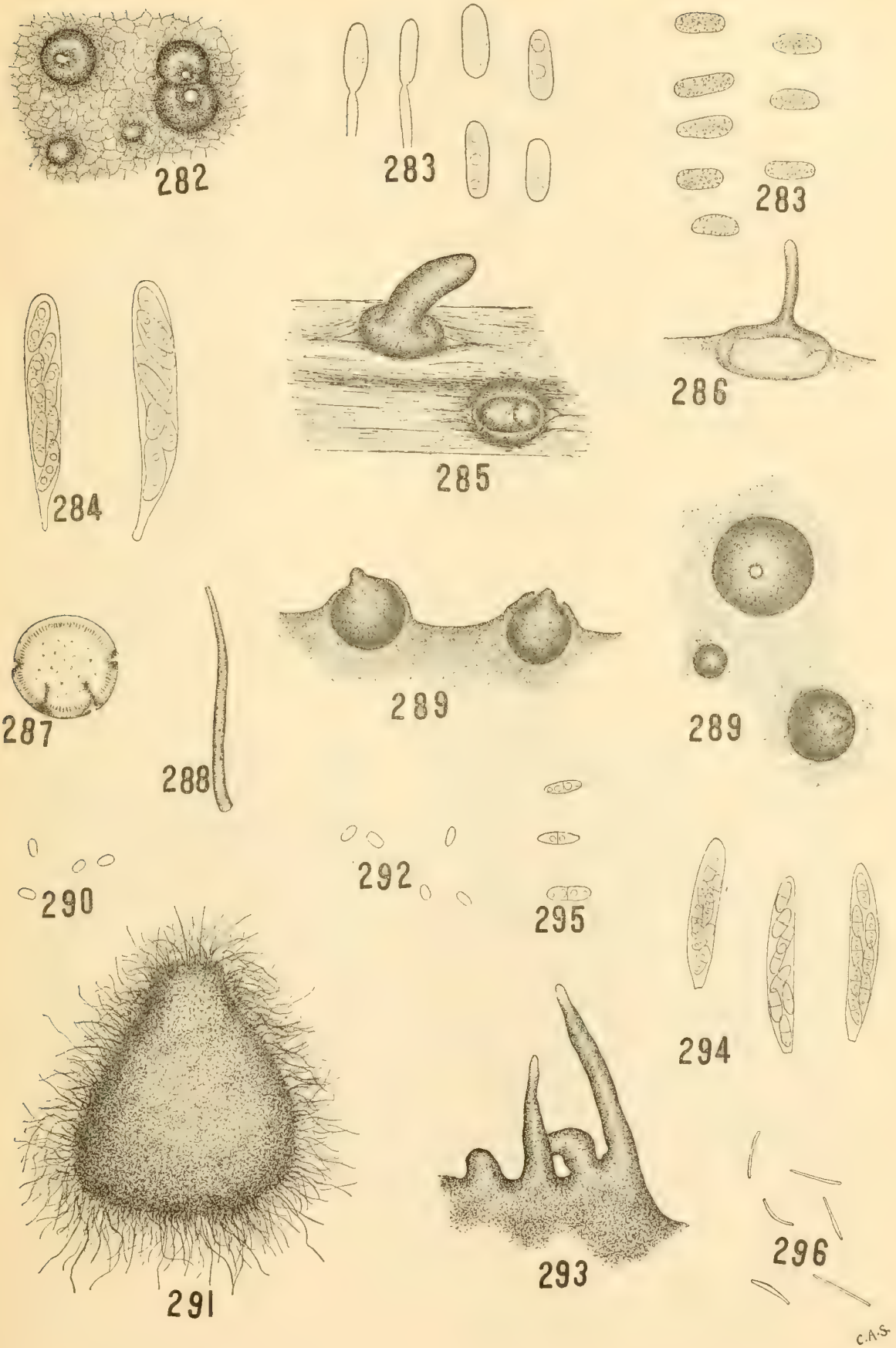
GNOMONIA CARYÆ Wolf. (= *Glœosporium caryæ* E. & D., page 98).

GNOMONIA CLAVULATA Ell. — On the fallen leaves of *Quercus nigra* and *Carya* sp. Perithecia membranaceous, globose, rough, 100-165 μ in diameter, buried in tissues of the leaf, the base projecting on lower surface and cylindrical, obtuse beak above; asci narrow-elliptical, sub-acute, 4-guttulate becoming unequally 1-Septate and obtuse, hyaline to yellowish, 7.5-9 x 2-2.5 μ.

286. Perithecium, 2/3.

GNOMONIA LEPTOSTYLA (C. & D.) Bot. (= *Marssonia juglandis* (Lib.) Sacc., page 110).

GNOMONIA VENETA (Sacc. & Speg.) Kleb. (= *Glœosporium nevvisequum* (Fcl.) Sacc., page 100).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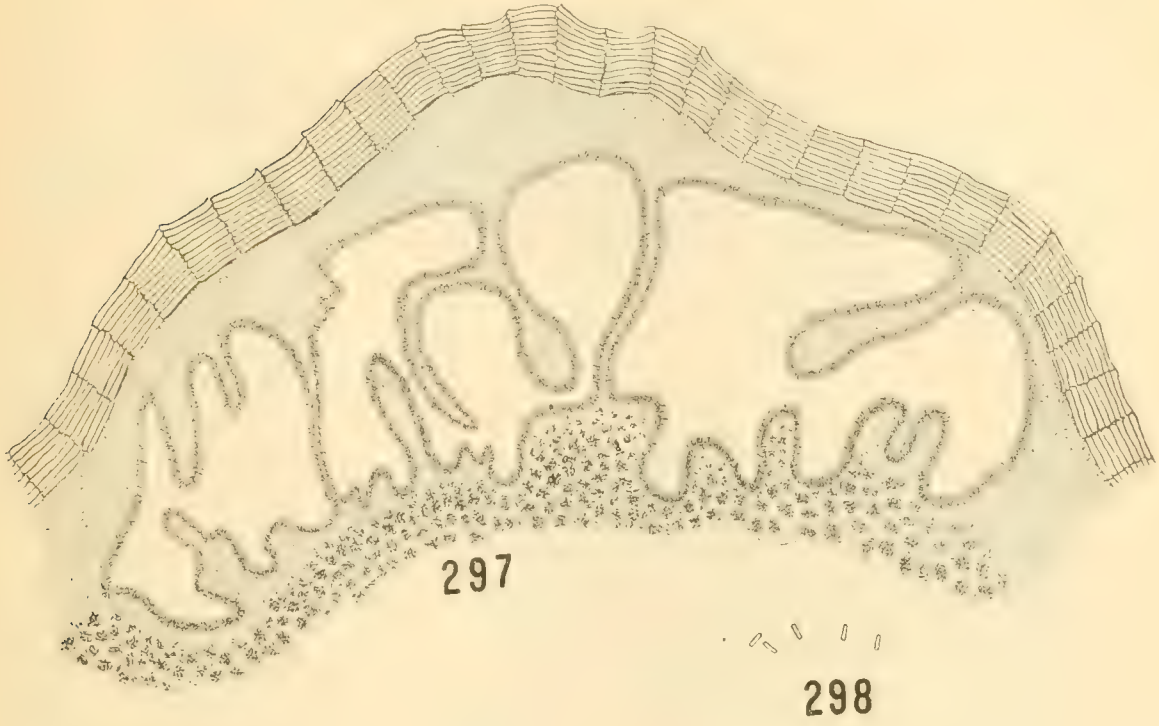
DIAPORTHE BATATATIS Harter & Field (= *Phoma batatæ* E. & H., page 70).—On the roots, stems and leaves of the sweet potato. Causes a dry rot. Pycnidia loosely grouped, emersed, erumpent, ostiolate 60-13 x 60-110 μ. Conidia oblong to fusoid, non-septate, usually 2-guttuate, hyaline, 6-8 x 3.5 μ. Perithecia subglobose, 120-370 μ; asci clavate to cylindrical, 23-38 x 7-12 μ; ascospores oblong to fusoid, 1-septate, slightly constricted, 2-4 guttulate, hyaline, 8-12 x 4-6 μ.

287. Cross-section of infected sweet potato showing rot following inoculation. 288. Small root showing pycnidia. 289. Pycnidia, 2/3. 290. Spores from same, 1/12. 291. Pycnidium from culture, 1/12. 292. Spores from same, 1/12. 293. Perithecia from culture, 2/3. 294. Asci, 1/12. 295. Ascospores, 1/12. 296. Scolecospores, 1/12.

ENDOTHIA PARASITICA (Murrill) And. — On the branches and trunk and sometimes on the fruits of the chestnut. Causes very pronounced cankers and finally kills the tree. Pycnidia large, densely grouped, smooth or nearly so, loculated; pycnospores emerging in tendrils, pale yellow, 1-3.5 μ; perithecia grouped, flask-shaped with long necks, ostiolate; asci oblong-clavate, 45-50 x 9 μ; ascospores oblong, uniseptate, slightly constricted, hyaline, 9-10 x 4-5 μ.

297. Cross-section of stroma showing pycnidia, 2/3. 298. Pycnospores, 1/12. 299. Cross-section of stroma showing perithecia, 2/3. 300. Asci, 1/6 and 1/12. 301. Ascospores, 1/12.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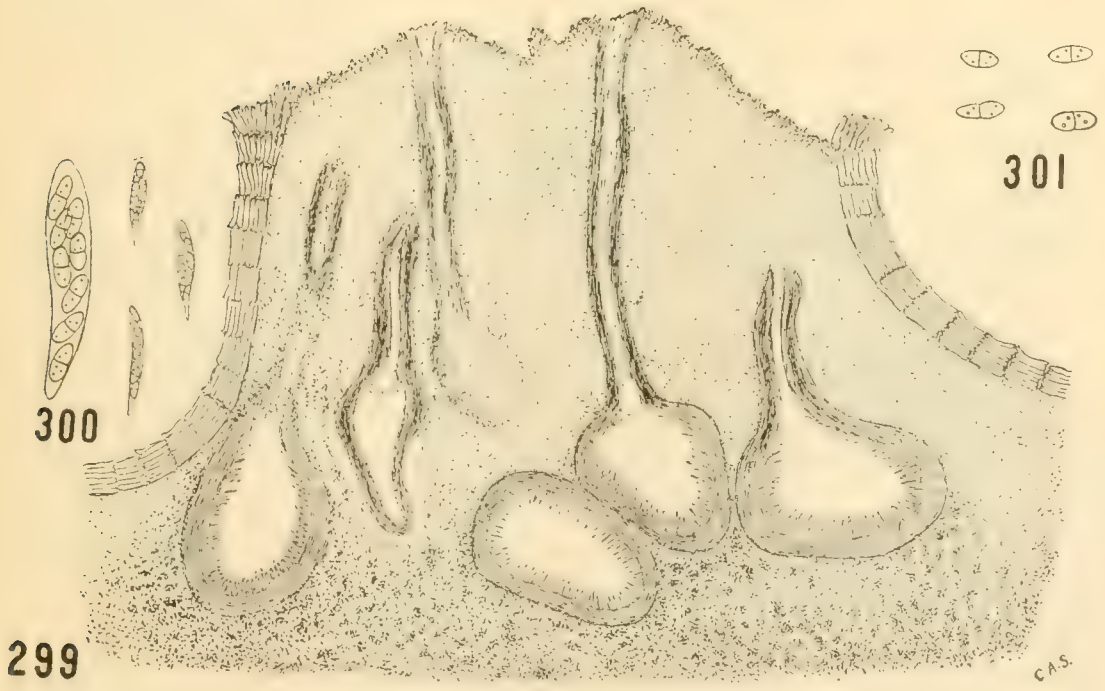
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BOTRYOSPHÆRIA RIBIS G. & D. (= *Dothiorella* sp., page 76).—On the canes of the currants. Causes a dying back or blight. Pycnidia compound, pycnospores fusoid, non-septate, hyaline, 18-31 x 4.5-8 μ. Perithecia somewhat cone-shaped, papillate, ostiolate, interspersed among the pycnidia, 175-250 μ; asci clavate, 80-120 x 17-20 μ; numerous filiform paraphyses; ascospores fusoid, non-septate, hyaline, 16-23 x 5-7 μ.

302. Twig of currant showing pycnidia. 303. Same enlarged. 304. Cross-section of stroma showing pycnidia, 2/3. 305. Pycnospores, 1/12. 306. Cross-section of stroma showing perithecia, 2/3. 307. Ascus, 1/12. 308. Ascospores, 1/12.

PHYLLOSTICTA ACERICOLA C. & E.—On the leaves of the maples. Causes irregular, brown-margined spots which frequently unite to form blotches. Pycnidia rather abundant in the central part of the spot; subepidermal, flask-shaped, dark brown, measuring 120 μ; conidia ovate, 8-0 x 5-6 μ.

309. Infected maple leaf. 310. Pycnidia, 2/3. 311. Spores, 1/12.

PHYLLOSTICTA ALLIARIÆFOLIÆ Allesch. — On the leaves of cultivated Campanula. Causes more or less circular, angular, ashy-colored spots with obscure margins, 4-12 mm. in diameter. Pycnidia lenticular, erumpent, dark; spores ovoid or oblong, small non-septate, hyaline, 4-6 x 2-3 μ.

312. Spores, 1/12.

PHYLLOSTICTA AMPELOPSIDIS E. & M. — On Virginia creeper (*Ampelopsis quinquefolia*), causing leaf spots. It is probably identical with *P. labruscae* Thüm. of the grape, which is an imperfect stage of *Guignardia bidwellii* (page 44).

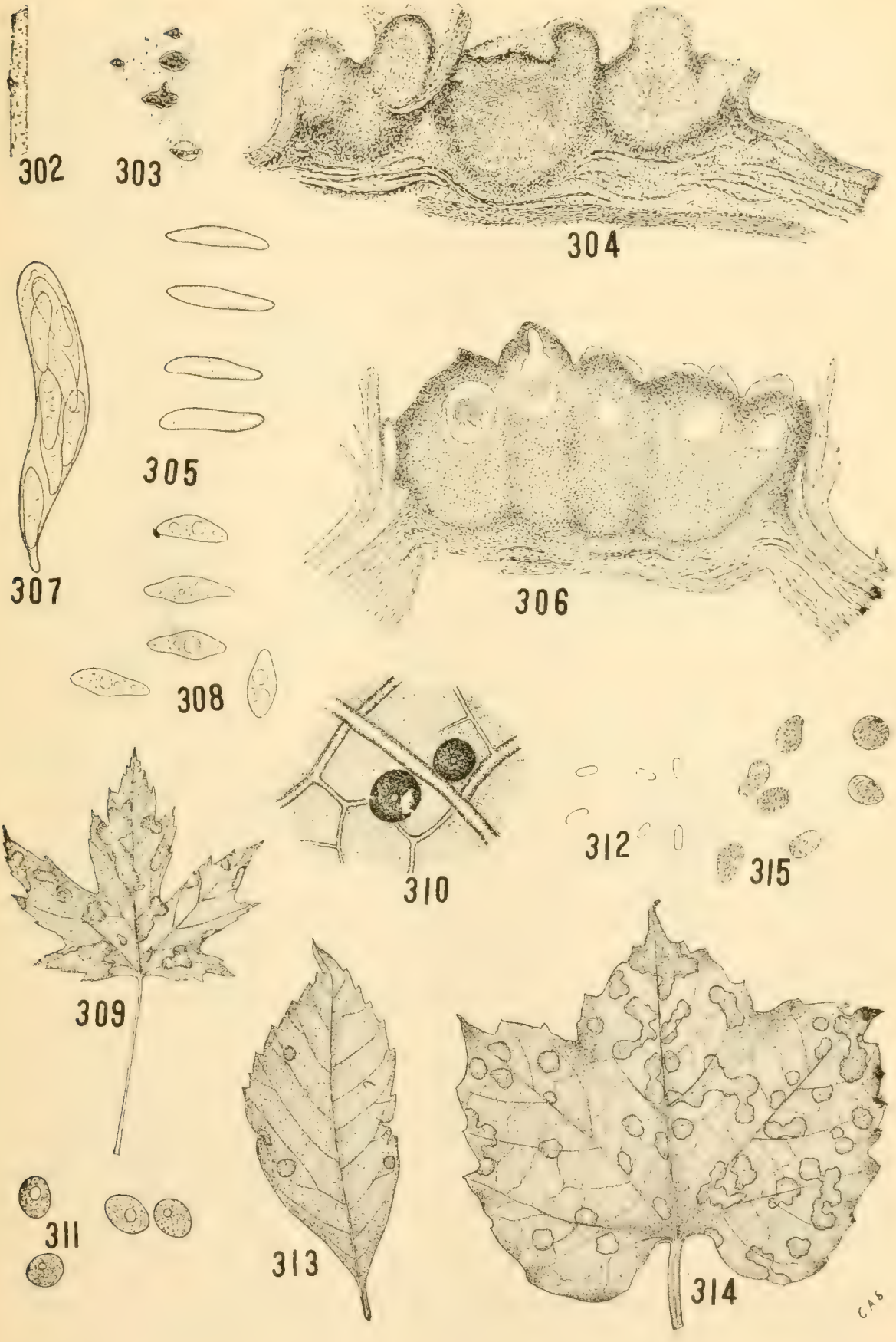
313. Infected leaflet of *Ampelopsis quinquefolia*. 314. Infected leaf of *Ampelopsis tricuspidata*. 315. Spore, 1/12.

PHYLLOSTICTA ARISTOLOCHIÆ F. Tassi.—On the leaves of *Aristolochia*. Causes more or less circular, or irregular dirty white leaf spots surrounded by a thin brown border. Pycnidia small lenticular, densely scattered, 50-60 μ in diameter; spores ovate or elliptical, hyaline, non-septate, 3-6 x 2-2.8 μ.

316. Infected leaf of *Aristolochia macrophylla*. 317. Spores, 1/12.

PHYLLOSTICTA AUERSWALDII Allesch.—On the leaves of *Buxus sempervirens*. Causes white leaf spots with indistinct margins. Pycnidia on both surfaces, few, sometimes many, ostiolate light brown; spores ovoid or oblong, non-septate, hyaline, 5-7 x 3-4 μ.

318. Pycnidia, 2/3. 319. Spores, 1/12.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PHYLLOSTICTA BATATICOLA E. & M.—On the leaves of the sweet potato. Causes small, roundish, whitish spots with purplish margins. Pycnidia scattered, minute, and black; conidia ellipsoid, 5 x 2 μ.

320. Infected leaf of *Convolvulus* sp. 321. Spores, 1/12.

PHYLLOSTICTA CASTANEÆ E. & E.—On the leaves of the chestnut. Causes brown or ochre-colored spots with obscure margins, 100 μ in diameter, collapsing, spores hyaline or smoky-colored, oval, sometimes obtusely pointed at one end, 5-7 x 2-2.5 μ.

322. Portion of infected leaf of *Castanea dentata*. 323. Spores, 1/12.

PHYLLOSTICTA CATALPÆ E. & M.—On the leaves of the Catalpa. Causes more or less circular, scattered, often confluent, brown spots 3-6 mm. in diameter. Pycnidia scattered sub-cuticular, small black, erumpent, 112 x 84 μ; conidia 5-7 x 2.5-4.5 μ.

324. Portion of infected leaf of *Catalpa* sp. 325. Pycnidia, 2/3. 326. Cross-section of pycnidium, 2/3. 327. Spores, 1/12.

PHYLLOSTICTA CIRCUMSCISSA Cke. — On the leaves of peach, cherry and other drupaceous hosts. Causes orbicular, reddish-brown spots with reddish margins, center falling out and producing shot-hole effect. Pycnidia dark, minute, scattered, spores elliptical, ovoid, 8 x 2 μ (in culture ovoid, elliptical or irregular, 2.6 x 2.6-4.4 μ). Usually associated with *Cercospora*.

328. Pycnidia, 2/3 from cherry leaf. 329. Spores from same, 1/12. 330. Spores, 1/12, from peach leaf. 331. Pycnidia, 2/3 from culture. 332. Spores from same, 1/12.

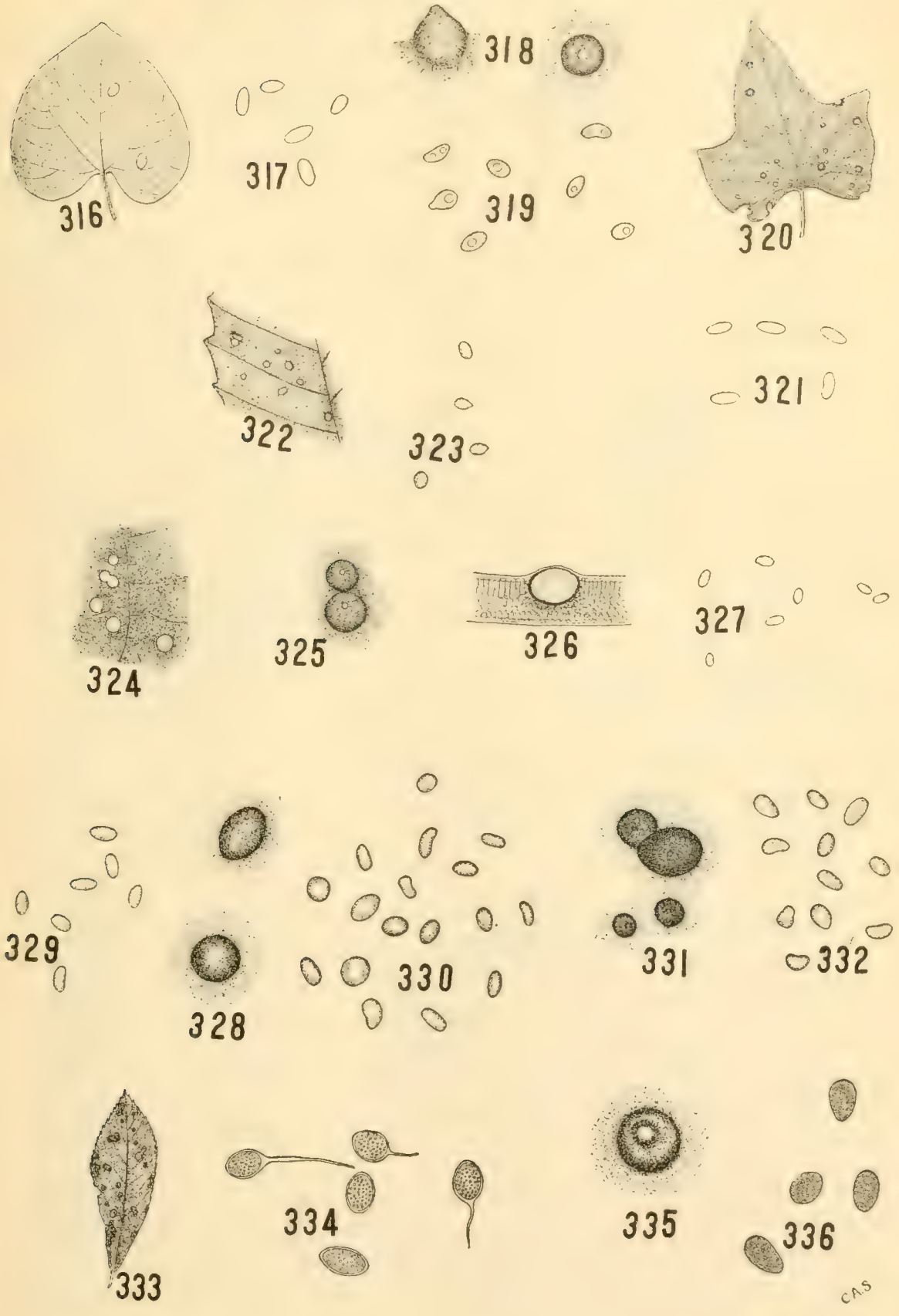
PHYLLOSTICTA CLETHRICOLA C. & M.—On the leaves of *Clethra alnifolia*. Causes circular, frequently confluent, reddish-brown spots, 2-10 mm. in diameter, with dark borders. Pycnidia on both surfaces of leaf, small, erumpent, ostiole small; conidia hyaline, ovate, guttuate surrounded by gelatinous envelope which frequently forms hair-like appendage, 9 x 6 μ.

333. Infected leaf of *Clethra alnifolia*. 334. Spores, 1/12.

PHYLLOSTICTA CONCENTRICA Sacc. — On the leaves of *Hedera helix*. Causes large, more or less circular, pale, dry spots. Pycnidia arranged concentrically, lenticular, dark, ostiole broad, 90-100 μ; spores globose to ovoid, hyaline, minutely pluriguttulate, 7.7-10 x 6.6-6.8 μ.

335. Pycnidium, 2/3. 336. Spores, 1/12.

PHYLLOSTICTA CRUENTA (Fr.) Kick.—On the leaves of *Smilacina racemosa*. Causes circular or oblong, sometimes confluent, reddish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spots, which become grayish with reddish borders at maturity, about 3-10 mm. in diameter. Pycnidia grouped or scattered, globose-lenticular, olive-black, erumpent; conidia hyaline, oval or ovate to oblong, granular, 14-16 x 5.5-6.5 μ.

337. Infected leaf of *Smilacina racemosa.* 338. Pycnidium, 2/3. 339. Spores, 1/12.

PHYLLOSTICTA GROSSULARIÆ Sacc.—On the leaves of the gooseberry. Causes more or less circular, dry, grayish-white spots with darker margins. Pycnidia scattered; conidia ovoid or ellipsoid, hyaline, 5-6 x 3 μ.

340. Infected leaf of *Grossularia* sp. 341. Pycnidium, 2/3. 342. Spores, 1/12.

PHYLLOSTICTA HALSTEDII E. & E.—On living leaves of *Syringa vulgaris.* Causes reddish spots between larger veins, becoming brown and wrinkled. Spots on both surfaces of the leaves ¼ to 1¼ cm. in diameter and with definite narrow dark border. Pycnidia on both sides of leaf, few, lenticular, 100-150 μ in diameter, spores broad, fusoid-oblong, straight, granular, rounded at the ends, 15-20 x 5-7 μ.

343. Part of infected leaf of *Syringa vulgaris.* 344. Pycnidium, 2/3. 345. Spores, 1/12 from two sources. 346. Germinating spores, 1/12.

PHYLLOSTICTA HIBISCI Peck.—On leaves of *Hibiscus moschatus* var. *crimsoni.* Causes oval, circular or irregular, ashy-gray spots with narrow inner black and broad outer reddish borders, about 4-8 mm. in diameter. Pycnidia on the upper surface of the leaf, erumpent, ostiolate, brown to black, conidiophores single or branched, 10-20 μ long; spores oblong, oval, irregular, sometimes slightly curved, 1-2 guttulate, 7.5-10 x 3-4 μ.

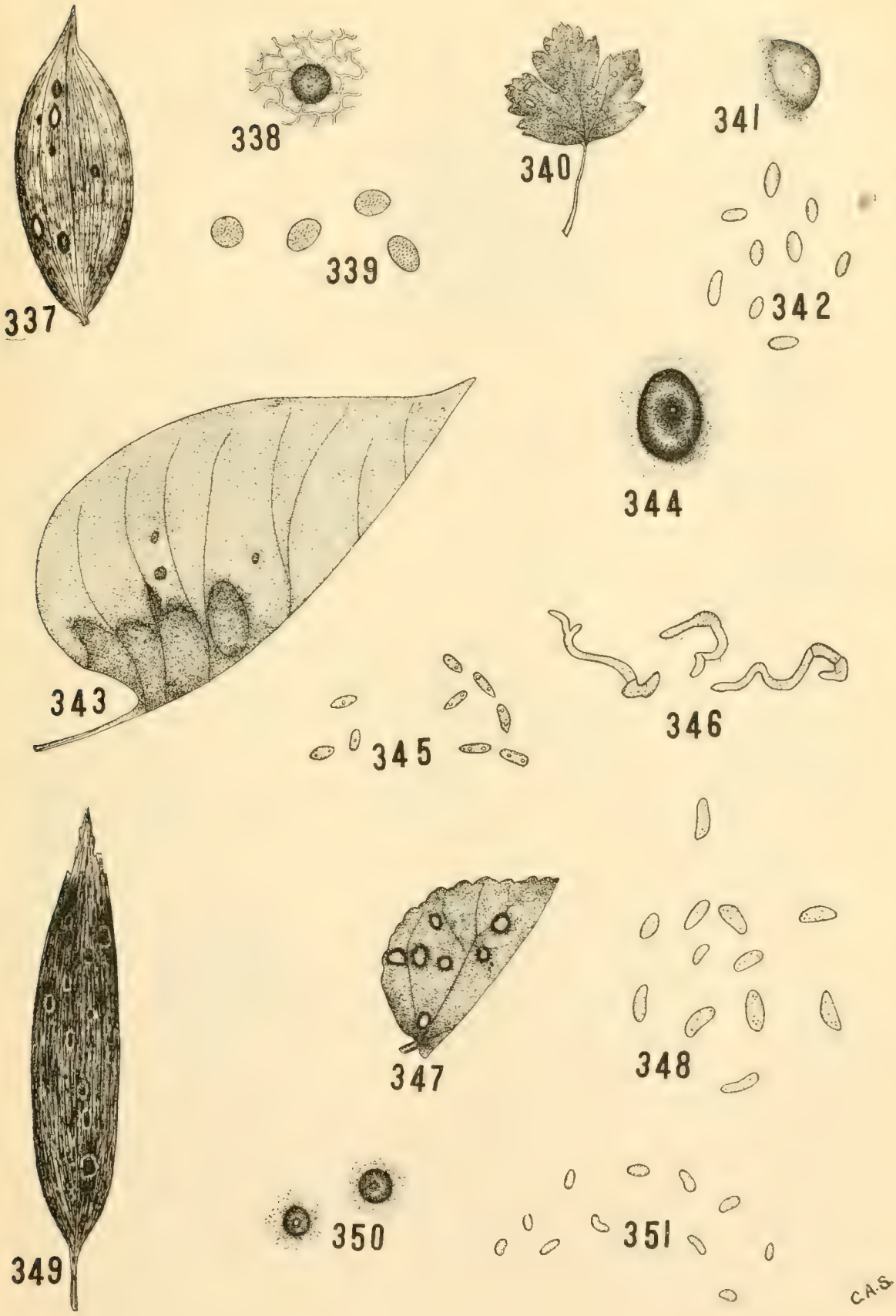
347. Portion of infected leaf of *Hibiscus moschatus.* 348. Spores, 1/12.

PHYLLOSTICTA HORTORUM Speg.—On the eggplant. (See *Phomopsis vexans* (Sacc. & Syd.) Harter, page 74.)

PHYLLOSTICTA LABRUSCÆ Thüm. — (See *Guignardia bidwelli,* page 44.)

PHYLLOSTICTA MACULICOLA Hals. — On the leaves of *Dracæna terminalis* and other species of *Dracæna.* Causes small, brown, ovate, somewhat angular spots with yellowish borders. Pycnidia borne on both surfaces, ostiolate, black and about 32.5 μ in diameter; spores ovate-oblong, frequently curved, hyaline.

349. Infected leaf of *Dracaena terminalis.* 350. Pycnidium. 351. Spores, 1/12.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PHYLLOSTICTA ORONTII E. & M. var. *advena*.—On the leaves of *Nymphæa advena*. Causes pale yellow to brown more or less concentrically-ridged spots, surrounded by narrow, definite, sub-elevated margin, center definitely margined and pale and bearing the pycnidia; pycnidia on both sides of the spot, erumpent; spores ovate and oblong, somewhat irregular, 5-8 x 2.5-3 μ. Also reported on *Orontium aquaticum*.

352. Spots on leaf of *Nymphæa advena*. 353. Pycnidia, 2/3. 354. Spores, 1/12.

PHYLLOSTICTA PAVIÆ Desm. (= *Guignardia æsculi* (Peck.) Stewart, page 42).

PHYLLOSTICTA PHASEOLINA Sacc. — On the leaves of beans. Causes scattered, irregular, more or less circular spots about 2-10 mm. in diameter. Pycnidia scattered, lenticular, erumpent, 70-90 μ in diameter; conidia ovoid to oblong, occasionally slightly curved, 4-6 x 2-2.5 μ.

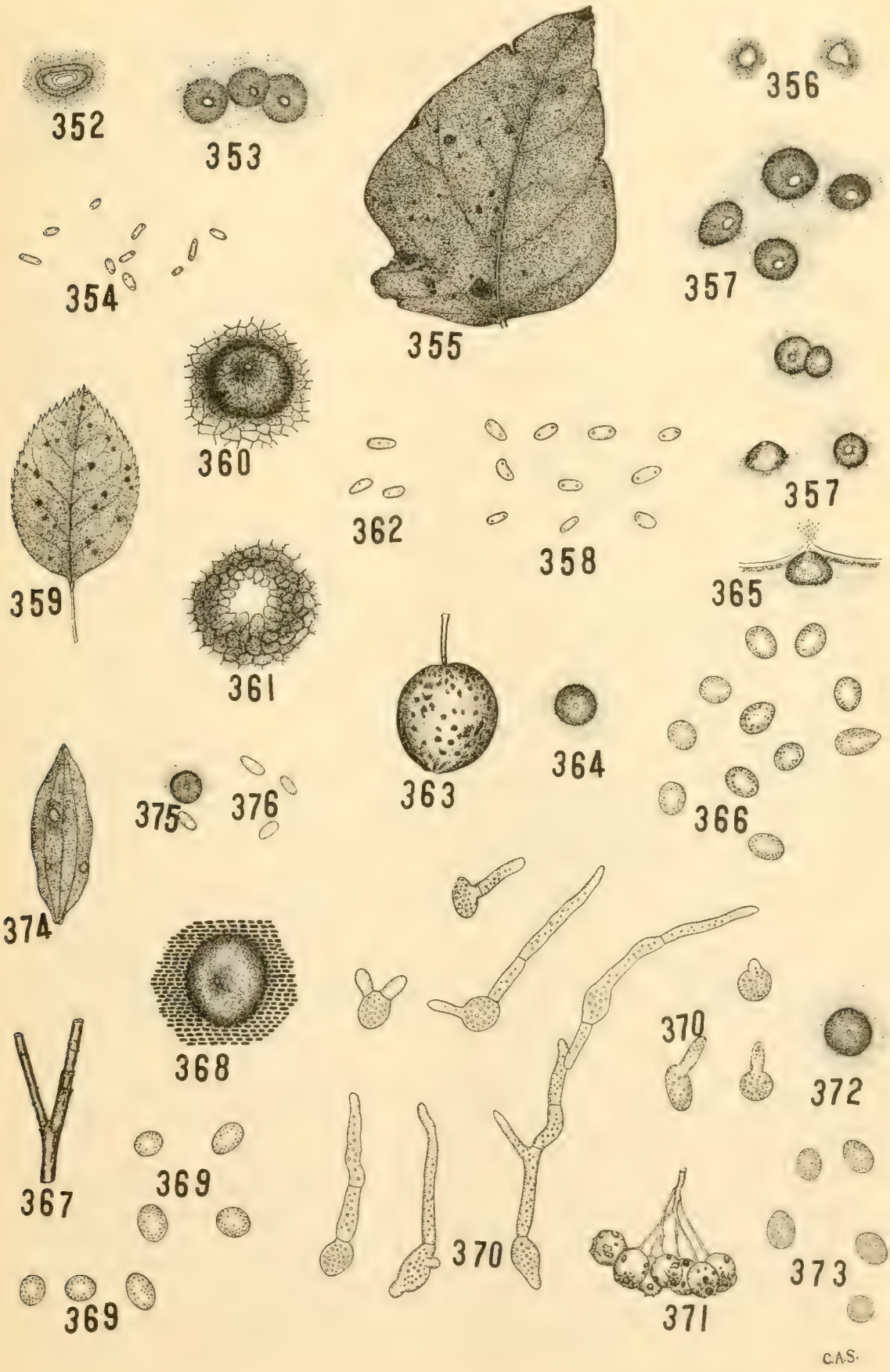
355. Infected leaflet of bean. 356. Leaf spots. 357. Pycnidia, 2/3. 358. Spores, 1/12.

PHYLLOSTICTA ROSICOLA Mass. — On the leaves of the rose. Causes irregular reddish spots, becoming dry with age, and often limited to the upper surface. Pycnidia prominent on the under side, black punctiform, 50-70 μ in diameter; spores small oblong, 2.5 x 1 μ.

359. Infected leaf of rose. 360. Pycnidium, 2/3. 361. Ostiolium, 1/12. 362. Spores, 1/12.

PHYLLOSTICTA SOLITARIA E. & E. — On the leaves, twigs and fruits of the apple. Causes spots on leaves, cankers on twigs, and blisters on fruits. The leaf spots are small, irregular in shape, light brown, yellowish or whitish. The cankers on the twigs and fruit branches are usually small, with definite outline, reddish or purplish, becoming gray with a purplish margin which usually disappears; bark cankers along the line of demarcation between diseased and healthy tissue. On water sprouts the cankers are much larger and resemble those on the fruit. The fruit blotches start as small, light brown blotches which enlarge, become darker in color and irregular and jagged in outline. Pycnidia small and immersed in the tissue of the host. Conidia broadly elliptical, 8-10 x 5-6 μ.

363. Infected apple. 364. Pycnidium, 2/3. 365. Cross-section of pycnidium, 2/3. 366. Spores, 1/12. 367. Infected apple twig. 368. Pycnidium from same, 2/3. 369. Spores from the same, 1/12. 370. Germinating spores, 1/12. 371. Infected fruit of English hawthorne. 372. Pycnidium, 2/3. 373. Spores, 1/12.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PHYLLOSTICTA TENERRIMA E. & E.—On the leaves of *Saponaria officinalis*. Causes whitish to light brown spots with dark borders. Pycnidia 60-100 μ in diameter, ostiolate, spores hyaline, 4-6 x 2-2.5 μ.

374. Infected leaf of *Saponaria officinalis*. 375. Pycnidium, 2/3. 376. Spores, 1/12.

PHYLLOSTICTA VIOLÆ Desm.—On the leaves of pansies and violets. Causes white, circular spots. Pycnidia numerous, very small, brown; conidia very small, hyaline, subcylindric to oval, and about 10 μ long.

377. Portion of infected leaf of pansy. 378. Pycnidia, 2/3. 379. Spores 1/12.

PHOMA BATATÆ E. & H. (=*Diaporthe batatatis* Harter & Field, page 60).

PHOMA BETÆ* (Oud.) Fr.—On the leaves and roots of the beet. Causes blackening and dying of the leaves, beginning with the younger beet leaves, and a "damping off" of the seedlings. Pycnidia over dead parts, small, more or less spherical, 125-635 μ in diameter; spores 3.8-9.4 x 2.6-4.3 μ.

380. Pycnidium, 2/3. 381. Spores, 1/12.

PHOMA COLUTEÆ S. & R.—On the leaves of *Colutea aborescens*. Causes irregular confluent, gray spots with narrow dark brown borders. Pycnidia grouped, lenticular, brown, ostiolate; spores ovate-oblong to ovate, hyaline, 6-8 x 2.5-3.2 μ.

382. Infected leaf of *Colutea arborescens*. 383. Pycnidium, 2/3. 384. Spores, 1/12, from two sources.

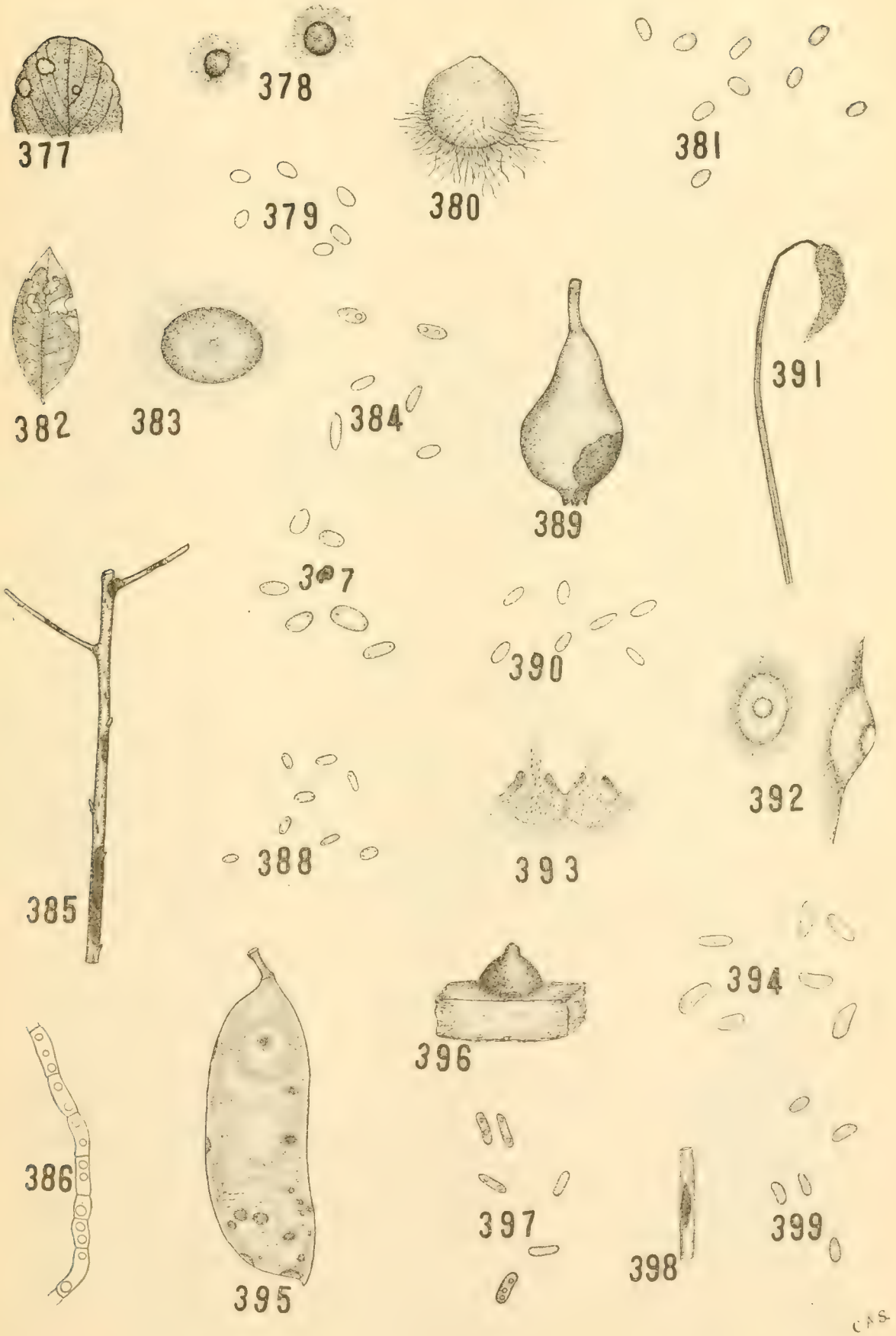
PHOMA JAPONICA Sacc.—On the twigs of *Kerria japonica*. Causes irregular-shaped cankers. Pycnidia covered, minute, black, globose-depressed or oblong; spores fusoid, guttulate, hyaline, 6.6-10 x 3.3-4 μ.

385. Infected twig of *Kerria japonica*. 386. Mycelium, 1/12. 387. Spores from twig, 1/12. 388. Spores from culture, 1/12.

PHOMA MALI Schulz & Sacc.—On the fruit of the pear and apple. Causes a canker or dry rot. Pycnidia grouped or subcutaneous depressed, ostiole scarcely breaking forth; conidiophores filiform; spores oblong-ovate to oblong fusoid, 5-8 x 2-3 μ.

389. Infected pear. 390. Spores, 1/12.

*Syn. *Phyllosticta betæ*.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PHOMA POLYGRAMMA (Fr.) Sacc. var. *plantaginis* Sacc.—On the flowering shoot just below the inflorescence of *Plantago lanceolata.* Causes a drooping and death of the diseased parts, which frequently fall away. No stroma present. Pycnidia minute, numerous, globose, depressed, smooth, light brown. Spores numerous, oozing in whitish tendrils, ovate or irregular, hyaline, 6-9 x 2-3 μ.

391. Infected inflorescence of *Plantago lanceolata.* 392. Pycnidium, 2/3. 393. Cross-section of same, 2/3. 394. Spores, 1/12.

PHOMA SUBCIRCINATA E. & E.—On the pods of the lima bean. Causes brownish or black spots. Described in Proc. Phil. Acad. Sci. (1893), p. 158, as follows: "Pycnidia subcuticular, 70-90 μ diameter, sublenticular, subconfluent, ostiolate, membranaceous, black, subcircinately arranged in large (1 cm.) circular, faintly zonate spots, finally spreading and occupying the entire surface of the pods. Spores oblong-elliptical, hyaline, 2 guttulate, 5-6 x 2-2.5 μ, on simple basidia rather longer than the spores."

We have also found a Phyllosticta on the leaves always associated with the *P. subcirinata* of the pods. They are probably the same organism.

395. Infected bean pod. 396. Pycnidium, 2/3. 397. Spores, 1/12.

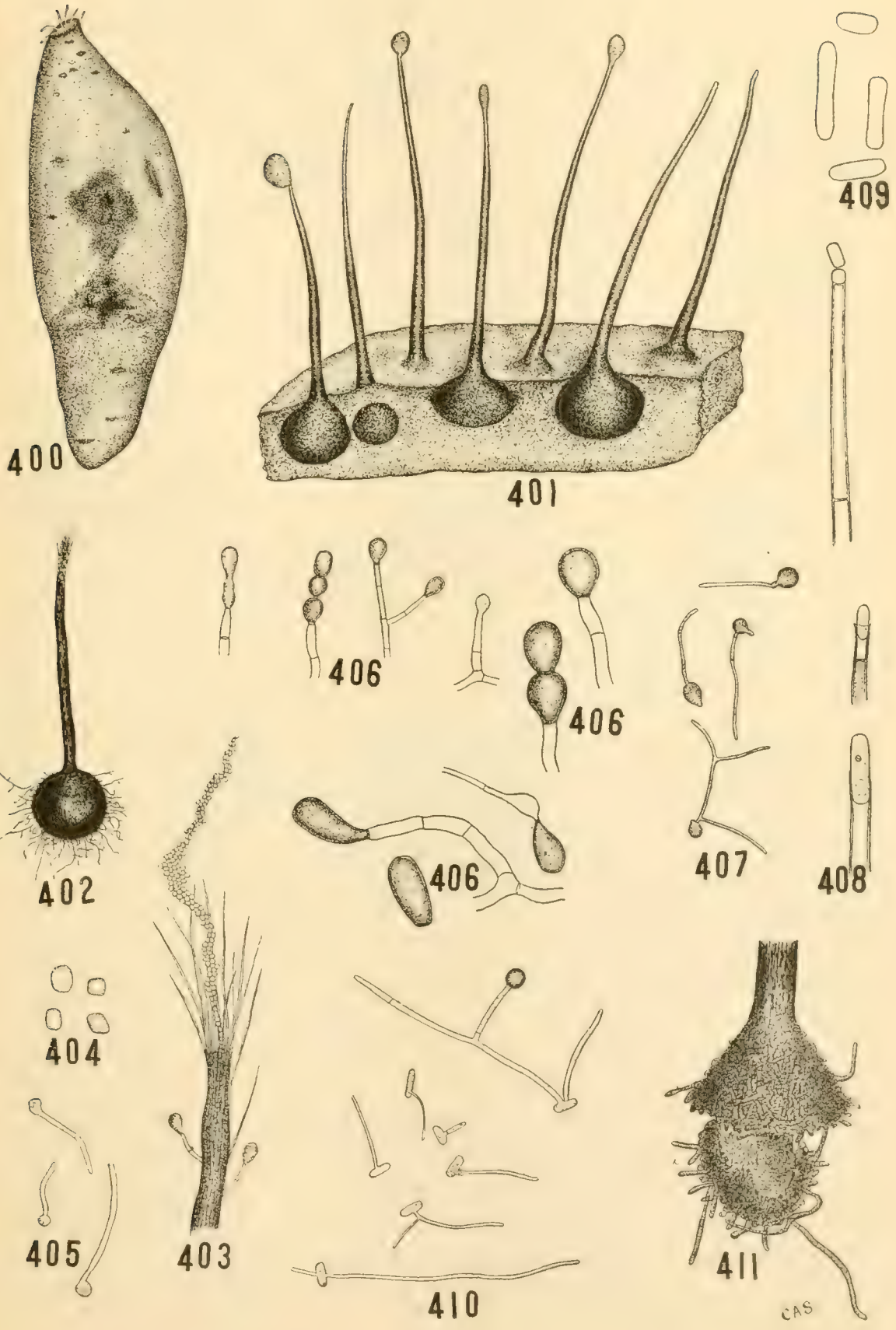
PHOMA THAPSI E. & E.—On the living stems of *Verbascum thapsus.* Causes elongated, conspicuous, brown spots. Pycnidia papilliform, ostiolate and piercing the blackened epidermis; spores oblong-elliptical, ends obtuse, 2-guttulate, 5-6 x 2.5 μ.

NOTE:—Spore measurements almost the same as *Phyllosticta verbasicola* but the pycnidia are shaped differently and the spores are larger and 2-guttulate.

398. Infected stem of *Verbascum thapsus.* 399. Spores, 1/12

PHOMA UVICOLA V. C. (= *Guignardia bidwellii* (E.) V. & R., page 44).

SPHÆRONEMA FIMBRIATUM (E. & H.) Sacc.—On the roots and stems of the sweet potato. Causes rots of both. Pycnidia black, base globose, 96-224 μ in diameter and embedded in the tissues of the host, beak very long projecting from host, 395-608 μ long, 24-34 μ at base, 14-20 μ at apex, the tips tapering and on maturity breaking into long, slender, hyaline fimbriations; pycnidia spores, globose or somewhat angular, hyaline, 5-9 μ. Mycelium 2-6 μ in diameter, frequently septate, giving rise to specialized hyphæ or conidiophores bearing two types of conidophores; the one olive-brown, thick-walled, globose to pear-shaped, 12-19 x 6-13 μ, formed by constric-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tion, and the other internally as hyaline, thin-walled, oblong-cylindric, endo-conidiospores, narrow in central part, 16-30 x 4-9 μ.

400. Infected sweet potato. 401. Pycnidia embedded in the surface tissue of the sweet potato. 402. Mature pycnidium, 2/3. 403. Tip of same, 1/6. 404. Pycnospores, 1/12. 405. Same, germinating, 1/6. 406. Chlamydospores, 1/6, 1/12. 407. Germinating chlamydospores, 1/6. 408. Endoconidiophores with emerging endoconidia, 1/6. 409. Endoconidia, 1/12. 410. Endoconidia germinating, 1/6. 411. Base of immature pycnidium broken open, 1/6.

VERMICULARIA CIRCINANS* Berk. — On the scales of bulbs of white onions. Spots usually orbicular; pycnidia concentrically arranged, very small and covered with long spines; conidia cylindrical, elongated, curved, rounded at the tips.

412. Infected onion bulb. 413. Pycnidium, 2/3. 414. Bristles, 1/12. 415. Bristles arising from pseudoparenchyma, 1/12. 416. Spores, 1/12.

VERMICULARIA DEMATIUM (Pers.) Fr.—On *Polygonum aviculare* and also reported on asparagus and in Europe on ginseng. Pycnidia conic and depressed, erumpent, superficial, frequently confluent, 80-120 μ, more or less covered with black spines with pale tips measuring 150-200 x 5 μ; conidia, elongated, cylindrical, slightly curved, rounded tips, 20 x 4-6 μ. Usually a saprophyte but frequently a parasite.

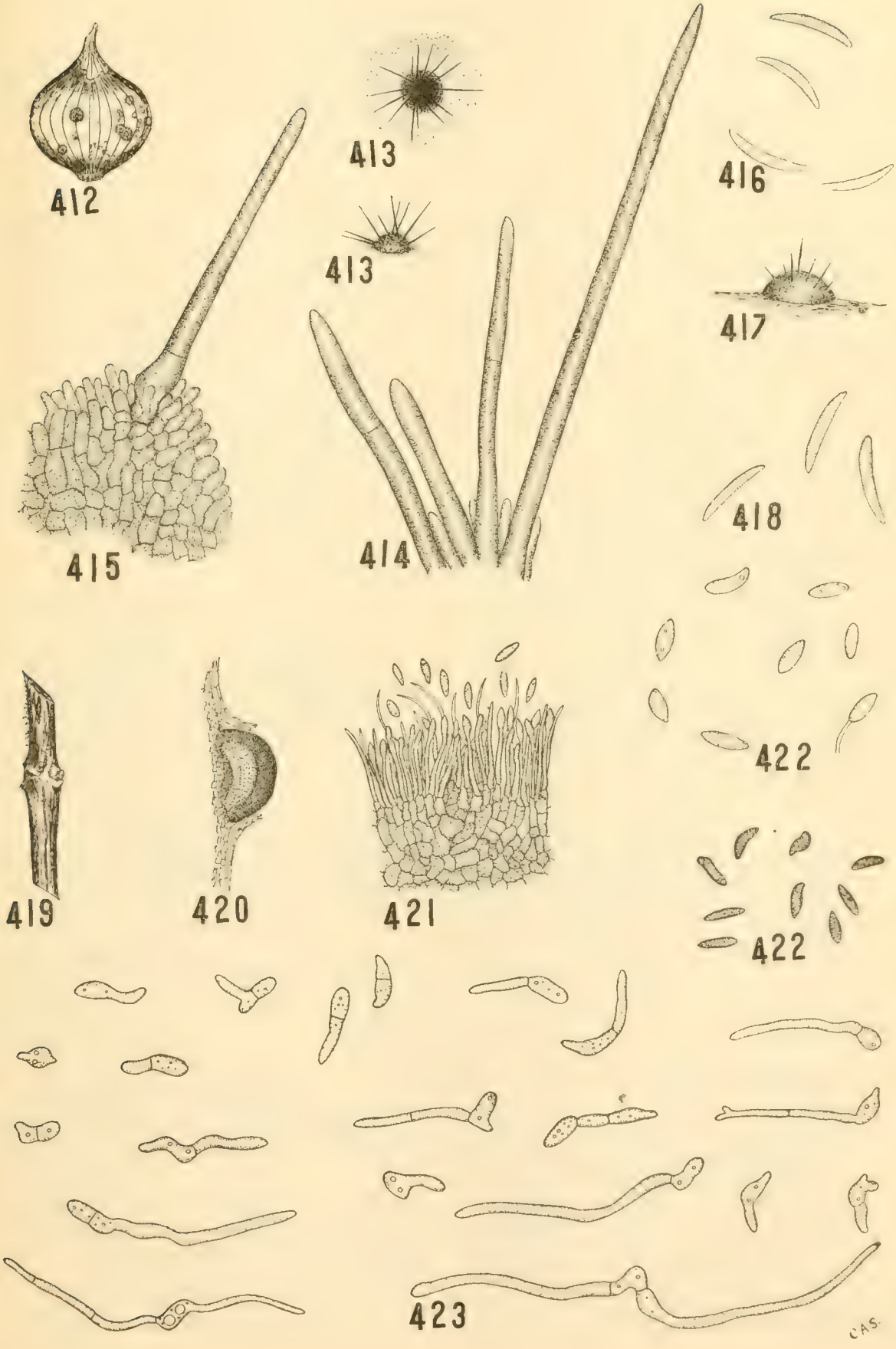
417. Pycnidium, 2/3. 418. Spores, 1/12.

FUSICOCCUM VITICOLUM Reddick (= *Cytosporella viticolum* Sh.). On stems and fruits of grapes. Causes the "dead arm" disease of the stems resulting in the wilting and dying of the vine; also causes a rotting of the ripe or nearly ripe fruit which is very similar to the black rot (*Guignardia bidwellii*). Pycnidia, small, brown and of many chambers, ostiolate but frequently rupturing. Spores emerging in black tendril-like masses, hyaline or smoky, non-septate, more or less fusoid, sometimes curved, 6.6-13.3 x 3-6.3 μ.

419. Infected cane of grape showing spore tendrils. 420. Cross-section of pycnidium, 2/3. 421. Same, 1/12. 422. Spores, 1/12 from two sources. 423. Germinating spores, 1/12.

PHOMOPSIS VEXANS (Sacc. & Syd.) Harter (= *Phyllosticta hortorum* Speg., page 66).—On the leaves, stems and fruit of the eggplant. Causes leaf spot, stem and fruit rots. Pycnidia loosely grouped, black, beaked, flattened or irregular in shape, buried but becoming erumpent, 60-200 μ broad on leaves and stem, 120-350 μ broad on fruit; conidiophores simple, short, straight or slightly

*Reported by J. C. Walker as *Colletotrichum circinans* (Berk.) Vogl. Meeting of the American Phytopathological Society, New York, Ober. 27-30, 1916.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curved, hyaline, non-septate; pycnospores subcylindrical, somewhat acute, non-septate, 2-, occasionally 3-guttulate, hyaline, 5-8 x 2-2.8 μ; stylospores filiform, curved, rarely straight, 13-28 μ long.

424. Pycnidium, 2/3. 425. Cross-section of same, 2/3. 426. Pycnospores, 1/12. 427. Stylospores, 1/12.

DOTHIORELLA MORI Berl.—On the twigs of mulberry. Causes cankers and a dying of the twigs. Pycnidia grouped, imbedded in the stroma, scarcely papillate, dark; conidiophores broadly filiform, hyaline, guttulate, 28-30 x 3-4 μ; spores ovate to oblong, walls thick, guttulate, hyaline, non-septate, 19-28 x 15-16 μ.

428. Cross-section through stroma showing pycnidia, 2/3. 429. Spores, 1/12.

DOTHIORELLA sp. (= *Botryosphaeria ribis* G. & D., page 62).

SPHÆROPSIS CYDONIÆ C. & E.—On the leaves and twigs of *Cydonia japonica.* Causes reddish-brown leaf spots and twig cankers. Pycnia immersed and punctiform; spores, brown, elliptical, 20-22 x 9 μ. We found what appeared to be the same species on *Amelanchier.* We believe that this is *S. malorum.*

430. Spores from *Cydonia japonica,* 1/12. 431. Spores from *Amelanchier* sp., 1/12.

SHPÆROPSIS JUNIPERI Peck.—On the bark and leaves of *Juniperus stricta.* Pycnidia, black, grouped, erumpent, many small 230-275 μ in diameter, spores oblong or ellipsoid, 20-23.5 x 11.5-13.5 μ. Also reported on *J. virginiana.*

432. Spores, 1/12.

SPHÆROPSIS MORI Berl.—On twigs of mulberry. Causes small cankers. Pycnidia sparse, or somewhat grouped, dark, globose, embedded in a fissure, collapsing, short ostiolum, conical, 1/3-1/2 mm. in diameter; basidia hyaline, short and rather broad; spores oblong-ovate, base attenuated, deeply olivaceous, 15-18 x 10-2 μ.

433. Spores, 1/12.

SPHÆROPSIS RUBICOLA C. & E.—On raspberry canes. Causing cankers. Pycnidia dark, subgregarious, erumpent, invisible until exposed by the splitting of the epidermis; spores brown, oblong, elliptical, 25-30 x 10 μ.

434. Spores, 1/12.

SPHÆROPSIS STAPHYLEÆ Brun. — On twigs and fruit pods of *Staphylea trifolia.* Causes cankers and spots. Pycnidia scattered, minute, globose; spores ovoid or oblong, brown, continuous, 20-30 x 9-11 μ.

435. Infected seed pod. 436. Spores, 1/12.

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SPHÆROPSIS MALORUM Peck. (= *Physalospora cydoniæ*, page 46).—On apple, quince, pear and hawthorne. Causes cankers on twigs, branches and sometimes on the trunks; the black rot of the fruits and a spotting of the leaves. The pycnidia somewhat variable and more abundant on the fruit than on stem cankers. They may be simple or compound, erumpent, surrounded by the broken epidermis, 200-460 x 200-720 μ.

437. Infected fruit of apple. 438. Infected branch of apple. 439. Spores from apple fruit, 1/12. 440. Spores from quince, 1/12. 441. Spores from flowering crab, 1/12. 442. Spores from apple twig showing Diplodia character, 1/12.

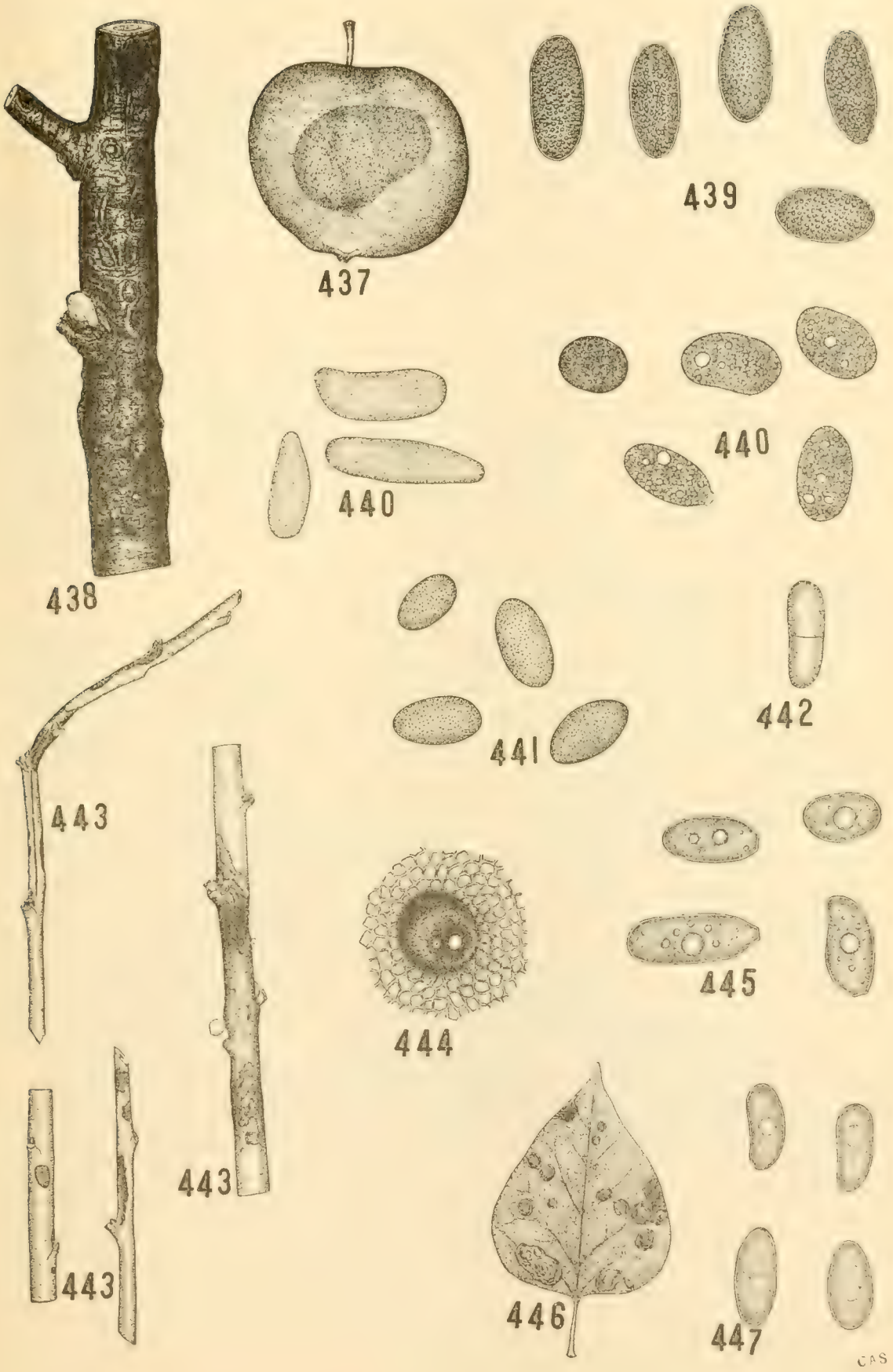
NOTE:—We have found what appears to be *S. malorum* on the young shoots of the peach. These cankers originate as small brown spots, enlarge, become irregular in outline, depressed and split lengthwise. The twigs are frequently bent and in advanced stages a gum is exuded. Pycnidia numerous, erumpent, ostiolate, black, spores oblong to ovate, sometimes truncate at point of attachment, 18.8-28.2 x 11.6-13.3 μ.

NOTE:—Bartholomew's "Fungi Columbiani" has specimens 1590 labelled *Sphæropsis persicæ* E. & B. in which the spores are 2-celled and apparently belong to *Diplodia persicæ* Sacc. Hesler reports the ascogenous form on *Hamamelis virginiana* L. and *Qurcus alba* L. (See Phytopathology, v. 3, p. 290-295 (1913) and Cornell Univ. Agr. Exp. Sta. Bul. 379.)

443. Cankers on peach twigs. 444. Pycnidium, 2/3. 445. Spores, 1/12.

SPHÆROPSIS SYRINGÆ (Fr.) Peck & Cke.—On the leaves and twigs of the *Syringa vulgaris.* Causes more or less frequently confluent spots. Pycnidia, black, grouped, slightly erumpent, subelliptical, depressed, rugulose, ostiolium, delicate; spores brown, oblong, 2-24 x 10-11 μ.

446. Infected leaf of *Syringa vulgaris.* 447. Spores, 1/12.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CONIOTHYRIUM CONCENTRICUM (Desm.) Sacc.—On the leaves of Yucca and Agave, causing spots and dying of the tips. Spots circular or oval, or irregular, frequently confluent, yellowish, ashy, surrounded by a broad, dark, regular to irregular border; pycnidia concentrically depressed, dark, spores globose to ovoid, hyaline, becoming yellowish and finally fuliginous, 4-5 x 3-4 μ.

448. Infected tip of Yucca leaf. 449. Spots on the leaf of *Agava* sp. 450. Pycnidium, 2/3. 451. Pycnidia with spore tendrils, 2/3. 452. Cross-section of pycnidium from Yucca, 2/3. 453. Spores from Yucca, 1/12. 454. Spores from Agava, 1/12.

CONIOTHYRIUM FUCKELII Sacc. (= *Leptosphæria coniothyrium* (Fcl.) Sacc., page 48).—On raspberries and roses. Causes a blighting and dying. The bark peels from the diseased part showing the small black pycnidia. (Pycnidia will also form on cut surfaces of canes in the moist chamber.) Pycnidia scattered, subcortical, erumpent globose-depressed, 180-200 μ; conidia numerous globose or slightly elliptic, those on raspberry measuring 2.5-4.4 x 2-3 μ, those on rose measuring 3-5 x 2-3.3 μ.

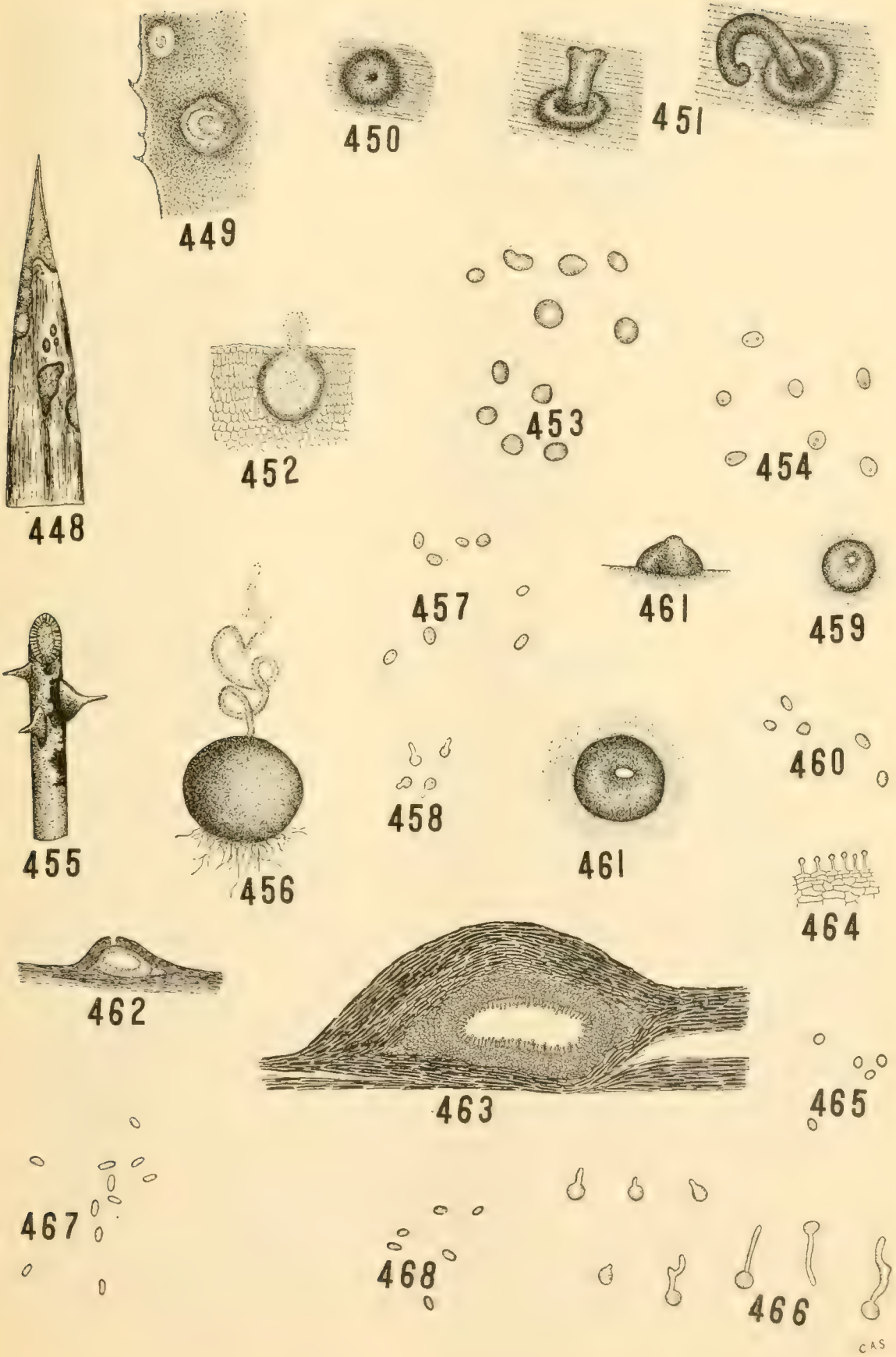
455. Infected cane of rose. 456. Pycnidium from leaf with emerging spores, 1/12. 457. Spores from same, 1/12. 458. Germinating spores, 1/12. 459. Pycnidium from leaf, 2/3. 460. Spores from same, 1/12. 461. Pycnidia from cane, 2/3. 462. Cross-section of same, 2/3. 463. Same, 1/12. 464. Hymenium from same, 1/12. 465. Spores from same, 1/12. 466. Germinating spores, 1/12.

CONIOTHYRIUM OLIVACEUM Bon. *grandiflorae* Sacc. — On the leaves of magnolia. Causes gray to brown circular or almost circular, sometimes irregular spots with definite margins, 1-5 mm. in diameter. Pycnidia on the lower surface, globose, dark, about 100 μ in diameter; spores oblong or elliptical, olive-brown, 5-7 x 3-4 μ.

467. Spores, 1/12.

CONIOTHYRIUM PLATANI Sacc. — On the under surface of the leaves of sycamore. Causes brown blotches visible on both surfaces. Pycnidia black, globose, erumpent. Spores very small, olivaceous to brown, unicellular, oval or nearly spherical, 3-3.5 x 2-3 μ.

468. Spores, 1/12.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ASCOCHYTA ALTHÆINA Sacc. & Bizz.—On the leaves of the hollyhock. Causes more or less circular, brownish spots, often with yellowish margins. Pycnidia brown, numerous, ostiolate; spores emerging in white tendril-like masses, ovate to oblong, more or less rounded at both ends, 1-septate, somewhat constricted at septum, hyaline, 6-10 x 2.8-4 μ.

469. Leaf spot. 470. Pycnidium, 2/3. 471. Immature and mature spores, 1/12.

ASCOCHYTA LETHALIS* E. & B. (= *Mycosphærella lethalis* Stone, page 44).—On stems and petioles of *Melilotus officinalis*. Causes peculiar irregular, dirty white, slightly raised brownish border, about 2-3 mm. in diameter. Pycnidia numerous, loosely grouped, semi-erumpent, smooth, orbicular, convex, becoming concave, brownish to black, ostiolate, 50-120 μ in diameter; spores oblong, cylindrical, obtuse at both ends, usually 1-, occasionally 2-septate, or non-septate, or uni- or bi-septate, slightly constricted, hyaline, 10-17 x 3.5-4.5 μ.

472. Infected stem of *Melilotus officinalis*. 473. Pycnidia, 2/3. 474. Spores, 1/12.

ASCOCHYTA LYCOPERSICI Brun. — On the foliage of greenhouse tomato plants. Causes small brown, circular, spots which gradually become larger, sub-circular or irregular and grayish, reddish or brown in color and marked with delicate, black, more or less irregular concentric circles somewhat similar to the spots caused by the early blight (*Macrosporium solani* E. & M.). Pycnidia few, minute, black; conidiospores oblong, 1-septate, constricted at the middle, hyaline, 8-10 x 2.5 μ.

475. Infected tomato leaf. 476. Pycnidia, 2/3 477. Cross-section of pycnidium, 2/3. 478. Spores, 1/12.

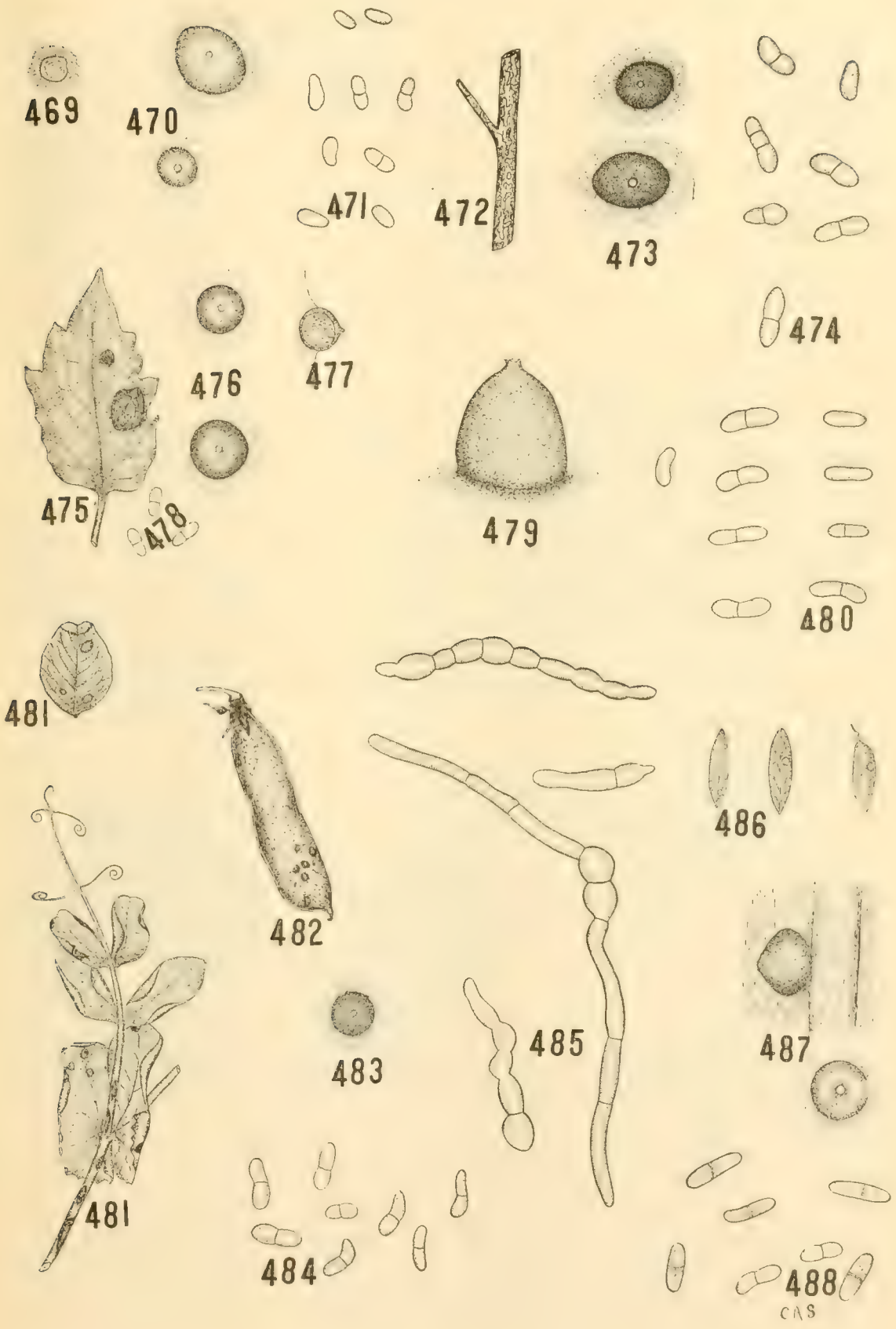
ASCOCHYTA RHEI† E. & E.—On the leaves of rhubarb. Causes reddish-brown, concentrically-zoned spots about 1 cm. in diameter. Pycnidia brown, loose, beaked; spores oozing out in tendril form, straight or curved, oblong-ovate, hyaline, 1- or 2-celled, constricted, variable in size, the largest measuring 14.4 x 3.5 μ.

479. Pycnidium, 2/3. 480. Spores, 1/12.

ASCOCHYTA PISI Lib. (= *Mycosphærella pinoides* B. & B., page 44).—On leaves, fruit, and stems of cultivated peas. Causes circular, yellowish spots of various sizes and brown margins. Pyc-

*Syn. *A. Caulicola* Lamb.

†Syn. *Phyllosticta rhei*.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nidia central, black, 5-7 μ; spore mass pink to flesh-colored, conidia oblong, slightly constricted at septum, 12-16 x 4-6 μ.

481. Infected stem and leaves. 482. Infected pod. 483. Pycnidium, 2/3. 484. Spores, 1/12. 485. Germinating spores, 1/12.

ASCOCHYTA VICIÆ* Lib.—On the leaves of Vicia. Causes leaf spots. Spots circular, reddish to orange red, margins elevated. Pycnidia minute-clustered, black, 90-100 μ; spores oblong, obtuse, 12-15 x 4-5 μ, exuding in white mass.

486. Infected leaflets and fruit pod of cultivated vetch. 487. Pycnidia, 2/3. 488. Spores, 1/12.

DARLUCA FILUM (Biv.) Cast. — On *Uredinia sori.* Pycnidia grouped, small conical to globose, ostiolate, dark, spores oblong fusoid, straight, 1-septate, usually slightly constricted, hyaline.

489. Pycnidia in sorus of *Puccinia* sp., 2/3. 490. Cross-section of leaf showing pycnidium in sorus, 2/3. 491. Pycnidium removed from host, 2/3. 492. Spores, 1/12.

ACTINONEMA ROSÆ (Lib.) Fr. (= *Diplocarpon rosæ* Wolf, page 34).—On the leaves of the rose. Causes black spots of irregular sizes and with radiating boundaries, frequently confluent and sometimes covering the entire leaf; pycnidia black, scattered or grouped; conidiophores short; conidia 2-celled, constricted, 18-20 x 5 μ.

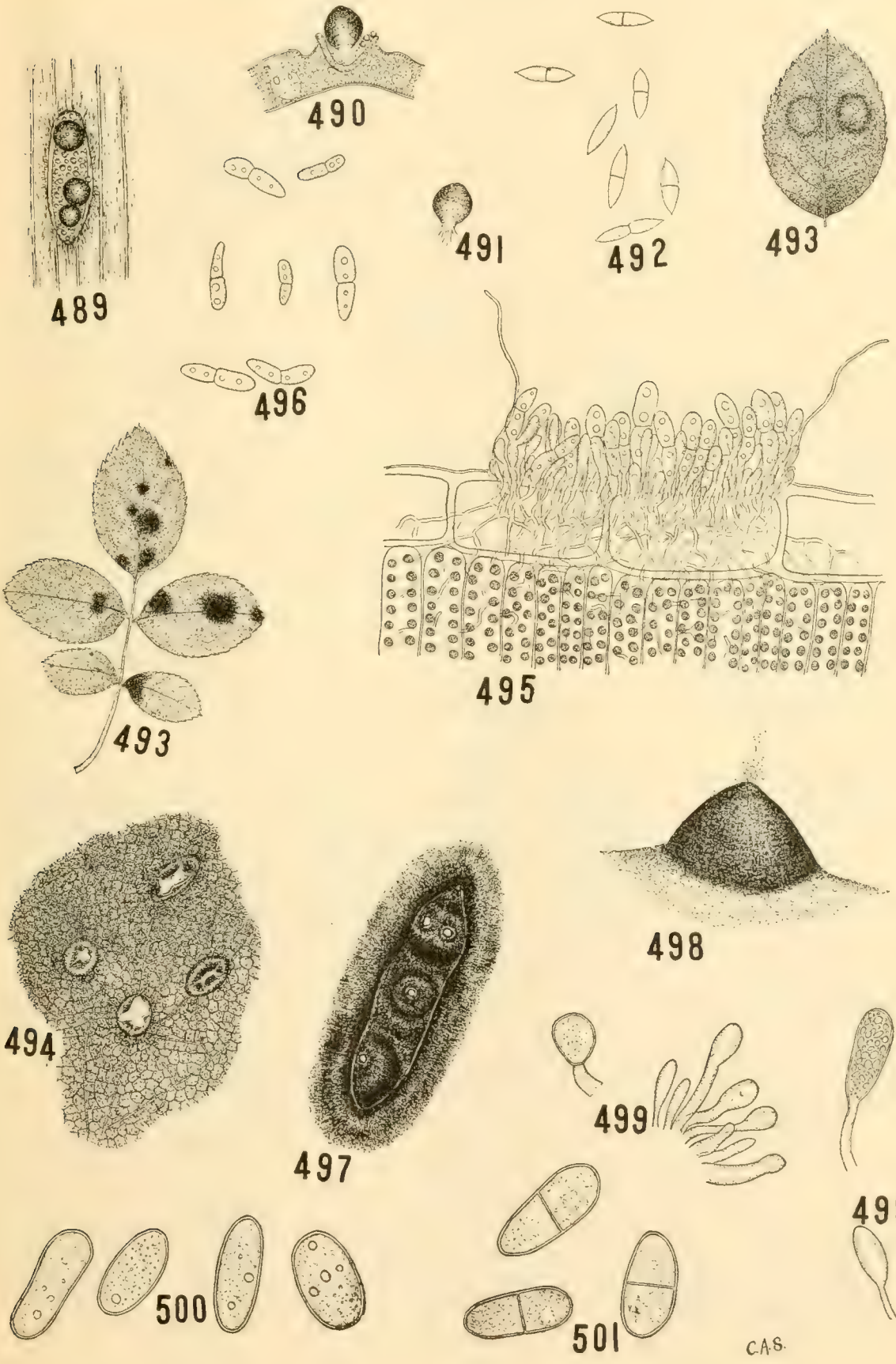
493. Infected rose leaf. 494. Acervuli, 2/3. 495. Cross-section of same, 1/12. 496. Spores, 1/12.

NOTE.—The apparent radiating hyphæ are in reality wrinkles on the cuticle. Therefore, this species should be placed in the genus *Marsonina* (*Marsonia*), Diedicke, H.—Die Abteilung Hyalodidymæ der Sphaerioideen. *In* Ann. Mycol., v. 10, 135-152 (1912).

DIPLODIA LONGISPORA C. & E.—On the twigs of *Quercus coccinea, Q. primus, Q. alba* and *Castanea dentata.* Causes cankers, a blighting and death of the infested parts. Pycnidia grouped, partly immersed, globose to sub-globose, ostiolate, dark-brown or black, 95-145 μ; spores oval or ovoid, often slightly smaller at one end, 1-septate, hyaline to yellow or dark-brown, depending on age, 29-35 x 7-11 μ.

497. Pycnidia rupturing epidermis, 2/3. 498. Pycnidium and emerging spores, 2/3. 499. Conidiophores and immature spores in various stages of development, 1/12. 500. Immature spores, 1/12. 501. Mature spores, 1/12.

*Probably the same as *Ascochyta pisi* [Stone, R. E.—The Life History of Ascochyta on some Leguminous Plants. *In* Ann. Mycol. v. 10, p. 564-592 (1912).]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DIPLODIA PINEA* (Desm.) Kickx.—On the stems and needles of pine. Causes cankers on the stems and a dying of the needles. Pycnidia globose, papillate, erumpent, the papilla falling away at maturity. Spores oblong, dark brown, thick-walled, 1-septate when mature, occasionally 2- or 3-septate, 35-40 x 16-18 μ.

502. Cross-section of pine needle showing pycnidia, 2/3. 503. Cross-section of pycnidium in bark, 2/3. 504. Conidiophores and spores in various stages of development, 1/12. 505. Immature spores, 1/12. 506. Mature spores with 1, 2 and 3 septa, 1/12. 507. Cankers on stem showing spores.

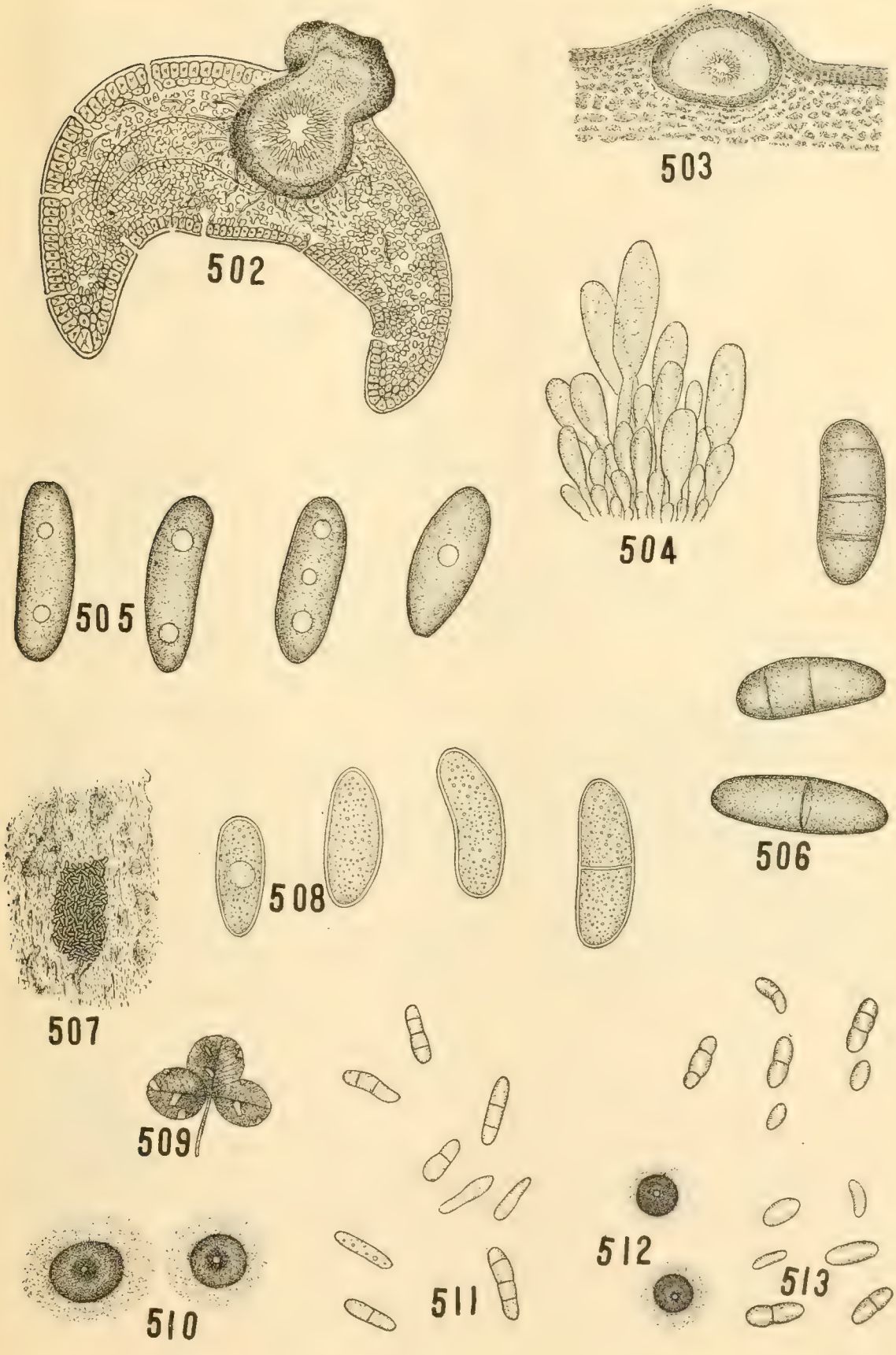
DIPLODIA SAPINEA (Fr.) Fckl.—On the branches of *Pinus sylvestris*. Pycnidia prominent, grouped, erumpent, globose, smooth, dark, ostiolum in the form of a papilla; spores, ellipsoid-oblong, somewhat unequally one-sided, dark, 24-26 x 12 μ.

508. Mature and immature spores, 1/12.

STAGONOSPORA CARPATHICA Baeuml.—On leaves of white clover (*T. repens*) and alfalfa. Causes small, circular or irregular spots which become dry and white or ashy-brown with dark, narrow margins. Pycnidia on both surfaces of leaf, sparse, globular, ostiolate, pale brown, 120-180 μ in diameter. Spores cylindrical straight, or occasionally slightly curved, flexuous, 1-celled, or 1-3 septate, sometimes constricted, 18 x 3.5 μ; on clover, 6-15 x 2.5-3.5 μ.

509. Infected leaf of *Trifolium repens*. 510. Pycnidia, 2/3. 511. Spores, 1/12. 512. Pycnidia from alfalfa, 2/3. 513. Spores, 1/12.

*Syn. *Sphæria pinea*.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SEPTORIA CERASTII Rob. & Desm. — On the leaves and stem of *Cerastium vulgatum.* Causes spots which are pale yellow, becoming ashy-gray at maturity. Pycnidia globose, lenticular, black ostiolate, 80 μ in diameter; spores escaping in whitish tendrils, hyaline, long, straight or slightly curved, 30-40 x 1 μ.

514. Pycnidia, 2/3. 515. Spores, 1/12.

SEPTORIA CHRYSANTHEMI Allesch.—On the leaves of the Chrysanthemum. Causes brown spots of various sizes and frequently a dying of the margins. When severe the leaves wither and fall. Spots ochre-colored with dark margins; pycnidia globular with short beak; spores long, straight or slightly curved, hyaline, sometimes obscurely septate, 32-57 x 1.5-2 μ.

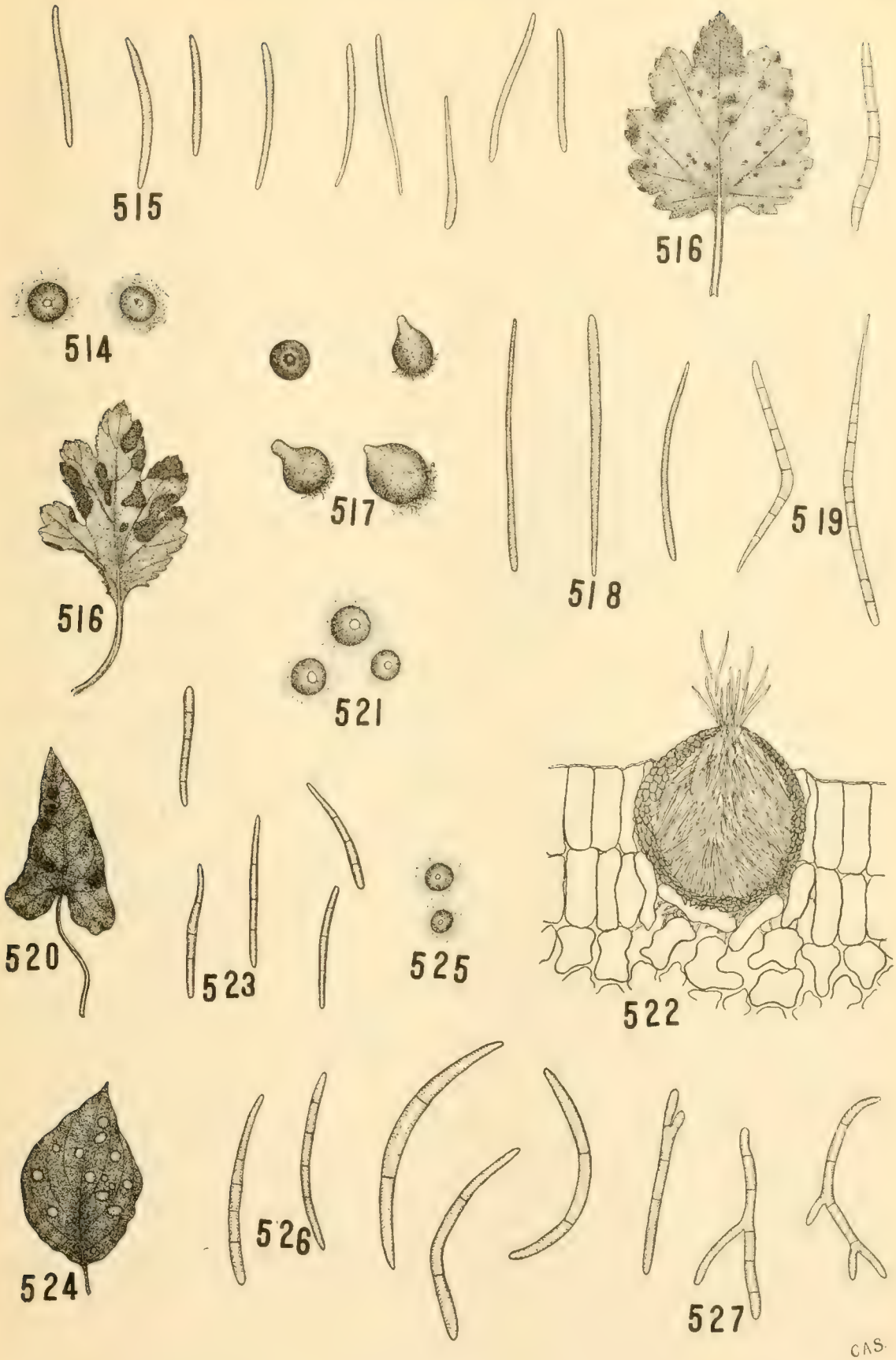
516. Infected leaves of Chrysanthemum. 517. Pycnidia, 2/3. 518. Immature spores, 1/12. 519. Mature spores, 1/12.

SEPTORIA CONVOLVULI Desm.—On the leaves of *Convolvulus arvensis.* Causes circular, sometimes confluent, reddish-brown spots becoming smoky-brown and finally whitish. Pycnidia minute, brown erumpent; spores long, straight or slightly curved, 3-5 septate, 35-50 x 1.5 μ.

520. Infected leaf of *Convolvulus arvensis.* 521. Pycnidia, 2/3. 522. Cross-section of pycnidium, 2/3. 523. Spores, 1/12.

SEPTORIA CORNICOLA Desm.—On the leaves of Cornus. Causes scattered, depressed, orbicular spots 100-110 mm. with dark purple margins. Conidia cylindric, curved, obsolete 2-4 septate, hyaline, 35-40 x 2-2.5 μ.

524. Infected leaf of *Cornus* sp. 525. Pycnidia, 2/3. 526. Spores, 1/12. 527. Germinating spores, 1/12.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SEPTORIA DIANTHI Desm.—On the leaves of cultivated *Dianthus.* Causes yellow, long, circular or irregular spots; pycnidia pear-shaped, depressed, blackish, ostiolate; spores in tendrils, elongated, cylindrical, curved, 1-2 septate, one end slightly larger than the other, hyaline, 30-45 x 4 μ.

528. Infected stems of *Dianthus* sp. 529. Pycnidia, 2/3. 530. Spores, 1/12.

SEPTORIA ERIGERONTIS B. & C.—On the leaves of *Erigeron* sp. Causes dark-brown circular spots with raised margins, visible on both surfaces, sometimes confluent, 3-4 mm.; pycnidia numerous, grayish-brown or black, erumpent, ostiolate, 63-105 μ; spores hyaline, filiform straight or slightly curved, attenuated at one end, non-septate, 30-45 x 1-1.5 μ.

531. Infected leaf of *Erigeron* sp. 532. Pycnidium, 2/3 533. Spores, 1/12.

SEPTORIA LACTUCÆ Pass.—On the leaves of lettuce. Causes irregular, angulated, brownish spots and frequently destroying the entire leaf. Pycnidia scattered, minute, punctiform and about 90 μ in diameter. Conidia filiform, straight or curved, 25-30 x 1.7-2 μ.

534. Pycnidia, 2/3. 535. Spores, 1/12.

SEPTORIA LOBELIAE Peck. — On the leaves of *Lobelia inflata.* Causes orbicular or oval, often confluent, dry, pale or light yellowish-brown spots sometimes with dark or browninsh-purple margins. Pycnidia on both surfaces, minute, numerous, dark, brown; spore tendrils white, spores hyaline, 1-3 septate, filiform, 17-27 x 1 μ.

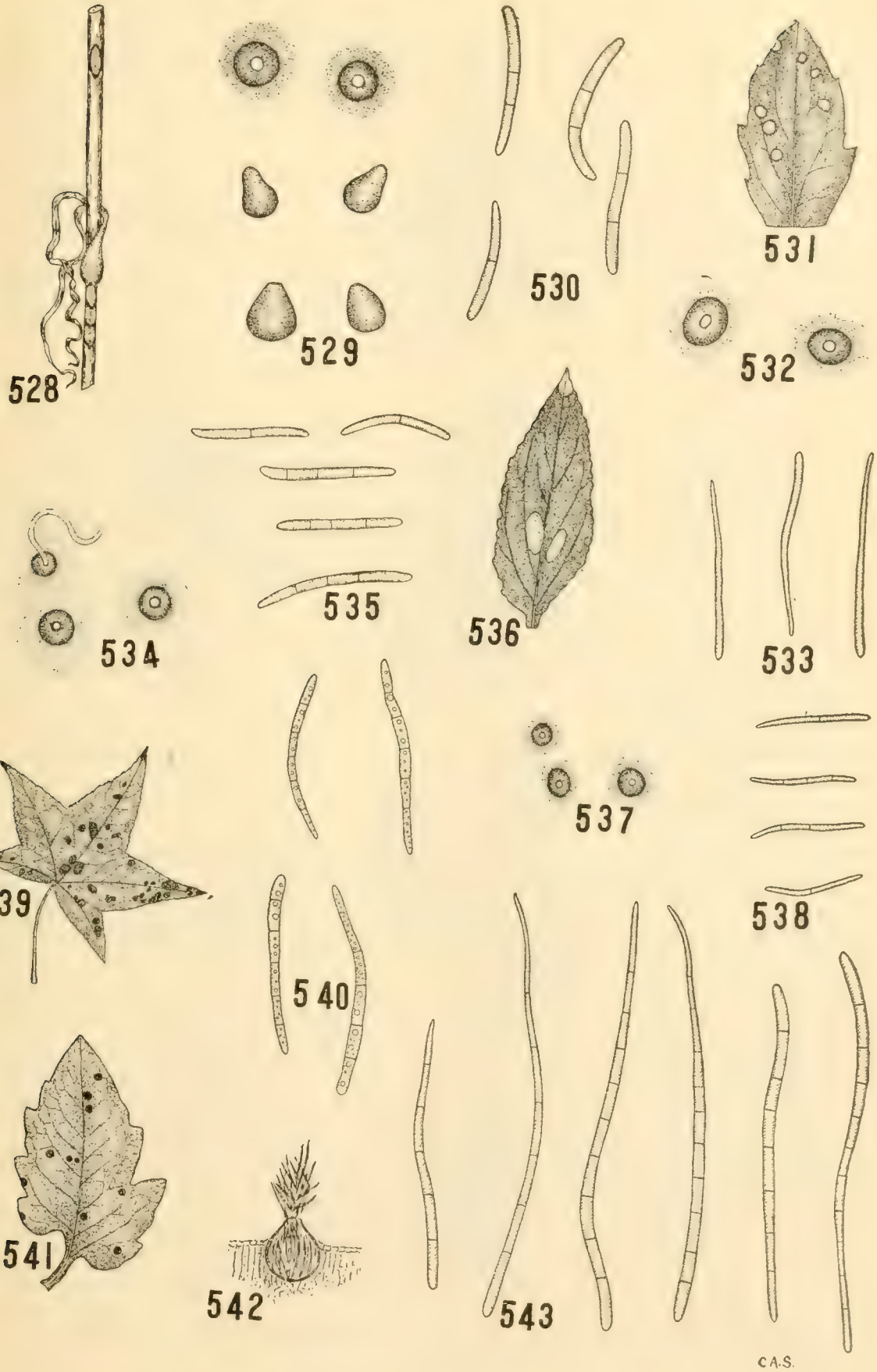
536. Infected leaf of *Lobelia inflata.* 537. Pycnidia, 2/3. 538. Spores, 1/12.

SEPTORIA LIQUIDAMBARIS C. & E.—On the leaves of *Liquidambar styraciflua.* Causes suborbicular brown spots about 1-2 mm. in diameter. Pycnidia on the under side of the leaf, prominent, clustered, ostiolate, sub-globose, 80 μ in diameter; spores hyaline, curved ends, 3-5 septate, 55-60 x 3 μ.

539. Infected leaf of *Luquidambaris styraciflua.* 540. Spores, 1/12.

SEPTORIA LYCOPERSICI Speg.—On the leaves and stems of the tomato. Causes numerous small black spots followed by a yellowing, dying and falling of the entire leaf. Pycnidia scattered, prominent and membranous; conidia elongate, cylindric, many septate, 70-110 x 3.3 μ.

541. Infected tomato leaf. 542. Cross-section of pycnidium, 2/3. 543. Spores, 1/12.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SEPTORIA MYRICÆ E. & W.—On the leaves of *Myrica cerifera.* Causes rusty-brown frequently confluent spots about 3-6 mm. in diameter on under surface of the leaf. Perithecia erumpent, black, conical and with broad opening at apex. Spores slender, curved, hyaline, 3-6 septate, 8-10 x 1.25 μ.

544. Infected leaf of *Myrica cerifera.* 545. Spores, 1/12.

SEPTORIA NABALI B. & C. — On the leaves of *Nabalus albus.* Causes leaf spots. Spots, numerous, circular, oval or sometimes irregular and confluent, white and surrounded by broad purplish border; perithecia dark brown, globose, erumpent, 57-90 μ; spores slender flexuose, 3-septate when mature, 20-36 x 2-2.5 μ.

546. Infected leaf of *Nabalus albus.* 547. Pycnidia, 2/3. 548. Spores, 1/12.

SEPTORIA PETROSELINI var. *Apii.* Br. & Cav.—On celery. Causes more or less circular, sometimes angular, spots on the leaves and petioles. Spots on leaves about 1.5 cm. in diameter, drab to brown, borders raised, frequently coalescing. Spots on petioles originate as water-soaked areas. Pycnidia simple or compound, globose or elliptical, 52-138 μ; conidia cylindrical, fusiform, filiform or curved, one end subacute, the other cylindrical, septa faint, nearly hyaline, 19.2-57.7 x 2.7-3.8 μ.

549. Infected leaf of celery. 550. Pycnidia, 2/3. 551. Spores, 1/12.

SEPTORIA PIRICOLA Desm. (= *Mycosphærella sentina* (Fr.) Schr., page 46).

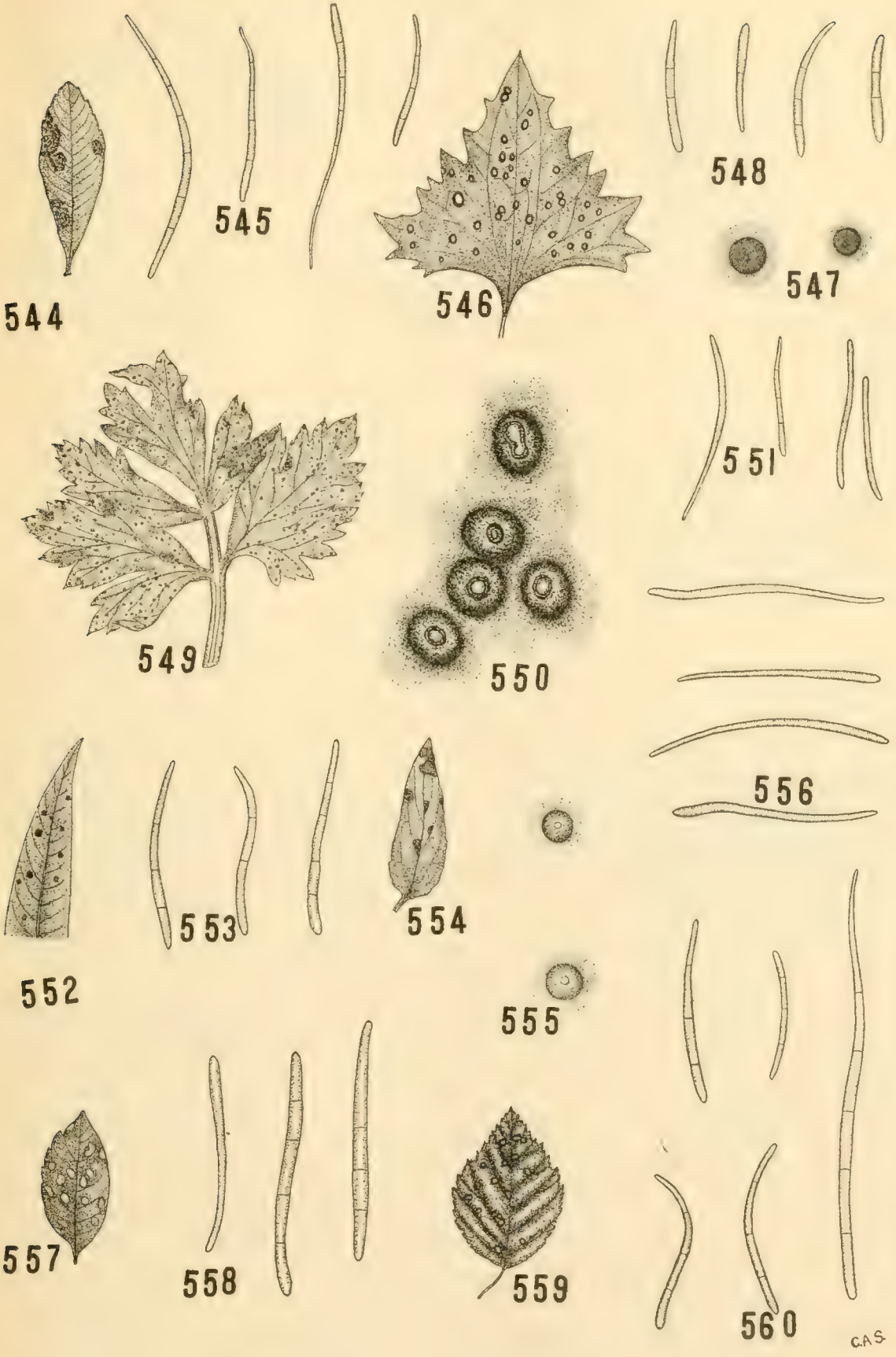
SEPTORIA POLYGONORUM Desm. — On leaves of *Polygonum.* Causes small, circular brown spots with dark borders; pycnidia minute, pale brown, erumpent, concave at maturity; spores filiform, 2-4 septate, hyaline, 25 x 1 μ.

552. Portion of infected leaf of *Polygonum* sp. 553. Spores, 1/12.

SEPTORIA PRUNELLÆ* Ell & Holw.—On the leaves of *Prunella vulgaris.* Causes dark brown or black spots of various shapes; pycnidia broad, prominent, scattered on upper surface of the spot, dark, smooth, 100-130 μ; spores somewhat dark, clavate, narrow, multi-septate, 40-75 x 1.5-2 μ.

554. Infected leaf of *Prunella vulagris.* 555. Pycnidia, 2/3. 556. Spores, 1/12.

*Given in Saccardo, P. A., "Sylloge Fungorum," as *Septoria brunellæ.*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SEPTORIA RHOINA B. & C.—On leaves of *Rhus copallina.* Causes spots. Spots reddish brown, circular, ovate, sometimes confluent; pycnidia numerous, black on both surfaces of the leaf; spores long, slender, flexuose, few septate, 50-86.5 x 3.3-6.3 μ.

557. Infected leaflet of *Rhus copallina.* 558. Spores, 1/12.

SEPTORIA RUBI West.—On the leaves and stems of the species of Rubus. Causes small, circular, reddish-brown spots which become white with purple borders; pycnidia sparse, curved, brownish-black, depressed, erumpent; spores filiform, hyaline, 2-3 septate, 40-55 x 1.5 μ.

559. Infected leaflet of raspberry. 560. Spores, 1/12.

SEPTORIA VERBASICOLA B. & C.—On the leaves of *Verbascum blattaria* L. Causes more or less circular, dry thin spots with broad, dark, purple borders and about 1-3 mm. in diameter, Pycnidia few on a spot, clustered, black, erumpent, 80-85 μ; spores hyaline, filiform, curved, 20-40 x 1.5 μ.

561. Infected leaf of *V. blattaria.* 562. Pycnidia, 2/3. 563. Spores, 1/12.

MELASMIA ACERINA Lev. (= *Rhytisma acerinum* (Pers.) Fr., page 24).

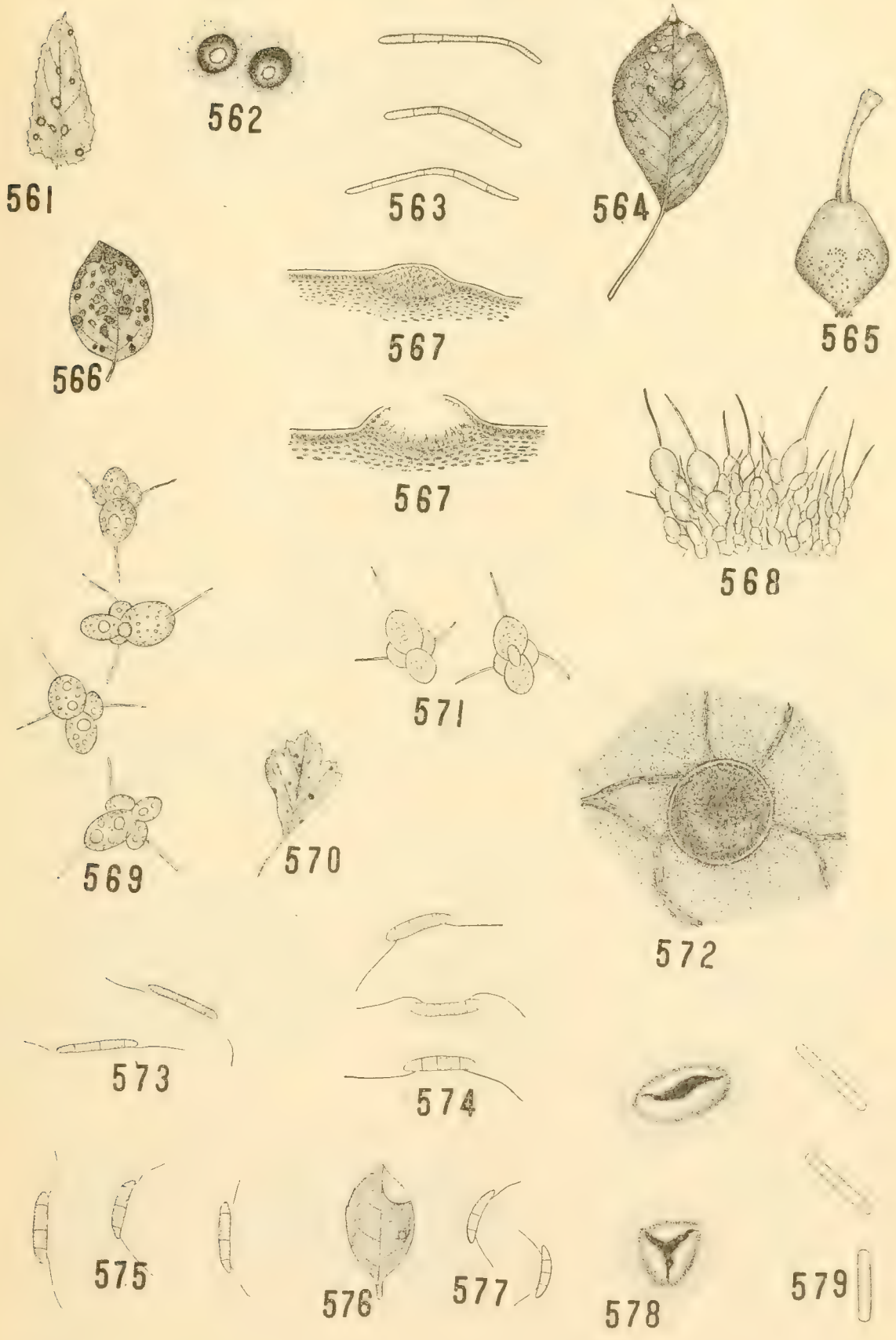
ENTOMOSPORIUM MACULATUM Lev. (*Fabræa maculata* (Lev.) Atk., page 24).—On leaf and fruit of the pear and quince. Causes spots which are more prominent on the upper surface, circular, at first reddish with dark borders, in severe cases causing the leaves to become brown and fall; fruit spots are red, gradually becoming very black, and in severe cases cause the fruit to crack. Acervuli, black, sub-epidermal; conidia hyaline, 18-20 x 12 μ, 4 cells in a group, stipe filiform, 20 x 0.75 μ, the other cells with long setæ.

564. Infected leaf of pear. 565. Infected fruit of pear. 566. Infected leaf of quince. 567. Cross-section of acervulus, 2/3. 568. Hymenium showing formation of conidia, 1/12. 569. Mature spores, 1/12.

ENTOMOSPORIUM THUMENII (Cke.) Sacc.—Causes small, dark, spots on the leaves of *Cratægus oxyacantha.* Probably the same as *E. Maculatum.* Acervuli numerous, on both surfaces of the leaf, flattened, orbicular, roughened, often confluent, conidia 22 x 9 μ.

570. Infected leaf of *Cratægus* sp. 571. Mature spores, 1/12.

DISCOSIA ARTOCREAS (Tode) Fr.—On the canes of the raspberry; associated with the *Coniothyrium fuckelii* cankers. Pycnidia grouped, disc-shaped, black, shining, at first convex becoming depressed and ostiolate and finally collapsing; spores elongated, very slightly curved, ends rounded, 3-septate, hyaline or yellowish, a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large cilium arising laterally near each end, 14-22 x 2-3.5 μ; cilia 10-15 μ long. Also occur on other hosts.

572. Pycnidium from rose leaf, 2/3. 573. Spores from same, 1/12. 574. Spores from raspberry, 1/12. 575. Spores from *Cercis candensis*, 1/12.

DISCOSIA MACULICOLA Gerard.—On the leaves of *Gaultheria procumbens*. Causes dry and whitish spots with narrow, dark borders on both surfaces of the leaf. Pycnidia densely grouped, at first covered but becoming erumpent, 150-170 μ; spores fusiform, slightly curved, obtuse ends, greenish hyaline to smoky-colored, 3-septate, 2 lateral cilia near the ends, 14-15 x 3-3.5 μ; cilia 6-7 μ long.

576. Infected leaf of *Gaultheria procumbens*, 1/12. 577. Spores, 1/12.

SPORONEMA OXYCOCCI Shear.—On the leaves and rarely on the fruit of the cranberry. Pycnidia scattered or grouped, dark brown, under the epidermis which ruptures by an irregular or triangualr slit, the upper portion thin and disappearing early, 50-100 μ in diameter; spores on short ovoid sporophores, hyaline, cylindrical and obtuse, 17-19 x 3-4 μ.

578. Pycnidia, 2/3. 579. Spores, 1/12.

SPORONEMA PULVINATUM Shear.—On the leaves of the cranberry. Pycnidia simple, dark brown, pulvinate, under the epidermis, 300-420 μ in diameter by 100-150 μ thick, sometimes collapsing, spores, pale greenish, yellow in masses, subelliptical, slightly curved, 6-8 x 2-2.5 μ.

580. Spores, 1/12.

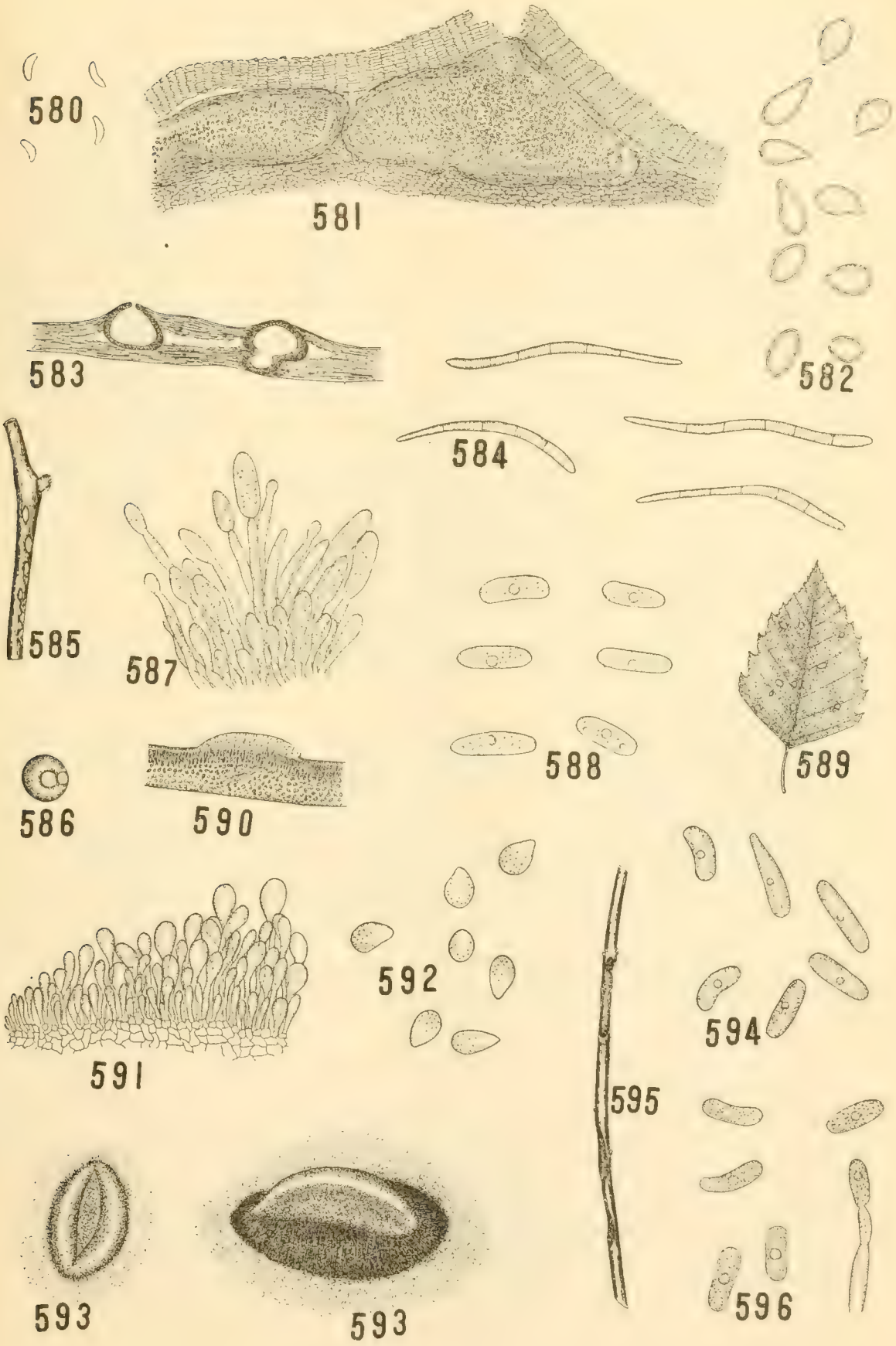
DOTHICHIZA POPULEA Sacc. & Br.—On the twigs of the Carolina and Lombardy poplar. Causes cankers and a dying of the diseased parts. Pycnidia numerous, loosely grouped and covered by the epidermis, but becoming erumpent dark, globose, depressed, becoming irregular, 0.75-1 mm. in diameter; spore in tendrils with a faint yellowish-brown tinge; spores globose-ellipsoid, in many cases with one end pointed, hyaline, 10-12 x 8-10 μ.

581. Cross-section of pycnidia, 2/3. 582. Spores, 1/12.

RHABDOSPORA RUBI. Ellis.—On the stems of the blackberry and raspberry. Pycnidia scattered, embedded in the tissues, subglobose, black, 100-195 μ; conidia linear, irregularly curved, 5-septate, 40-45 x 3 μ.

583. Pycnidia in tissue of plant, 2/3. 584. Spores, 1/12.

GLŒOSPORIUM AMPELOPHAGUM (Pass) Sacc.—On the fruit, leaf and cane of the grape. Causes the "bird's eye" rot of the fruit, more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or less circular or oblong, sometimes confluent spots with white sunken centers and red margins on the leaf and stem. Spots frequently crack open. Acervuli most common on fruit and twigs, very small, grouped, sub-epidermal, spore masses pink, conidia, usually oblong with rounded ends, sometimes slightly curved, hyaline, 5-6 x 2-3 μ.

585. Infected grape cane. 586. Infected berry. 587. Cross-section through acervulus showing conidiophores and conidia in various stages of development, 1/12. 588. Spores, 1/12.

GLŒOSPORIUM BETULARUM E. & M.—On the leaves of the red birch (*B. nigra*). Causes more or less circular yellowish-brown spots with black borders about 2-3 mm. in diameter. Acervuli brown, 120-140 μ. in diameter. Conidia, obovate, hyaline, 9-10.5 x 6 μ.

589. Infected leaf of red birch 590. Cross-section of acervulus, 2/3. 591. Same, 1/12. 592. Spores, 1/12.

GLŒOSPORIUM CINGULATUM Atk. = *Glomerella cingulata* (Atk.) S. & S., page 52).—On the leaves of *Ficus elastica.* Causes large spots and dying of the leaves. Acervuli numerous, black, erumpent, spore tendrils salmon-colored, broad and flat; conidia oblong, usually rounded at ends, sometimes slightly curved, hyaline, guttulate, 12-16.6 x 3.3-5 μ.

593. Acervuli on *Ficus elastica,* 2/3. 594. Spores, 1/12. 595. Infected twig of privet. 596. Conidiophore and conidia, 1/12.

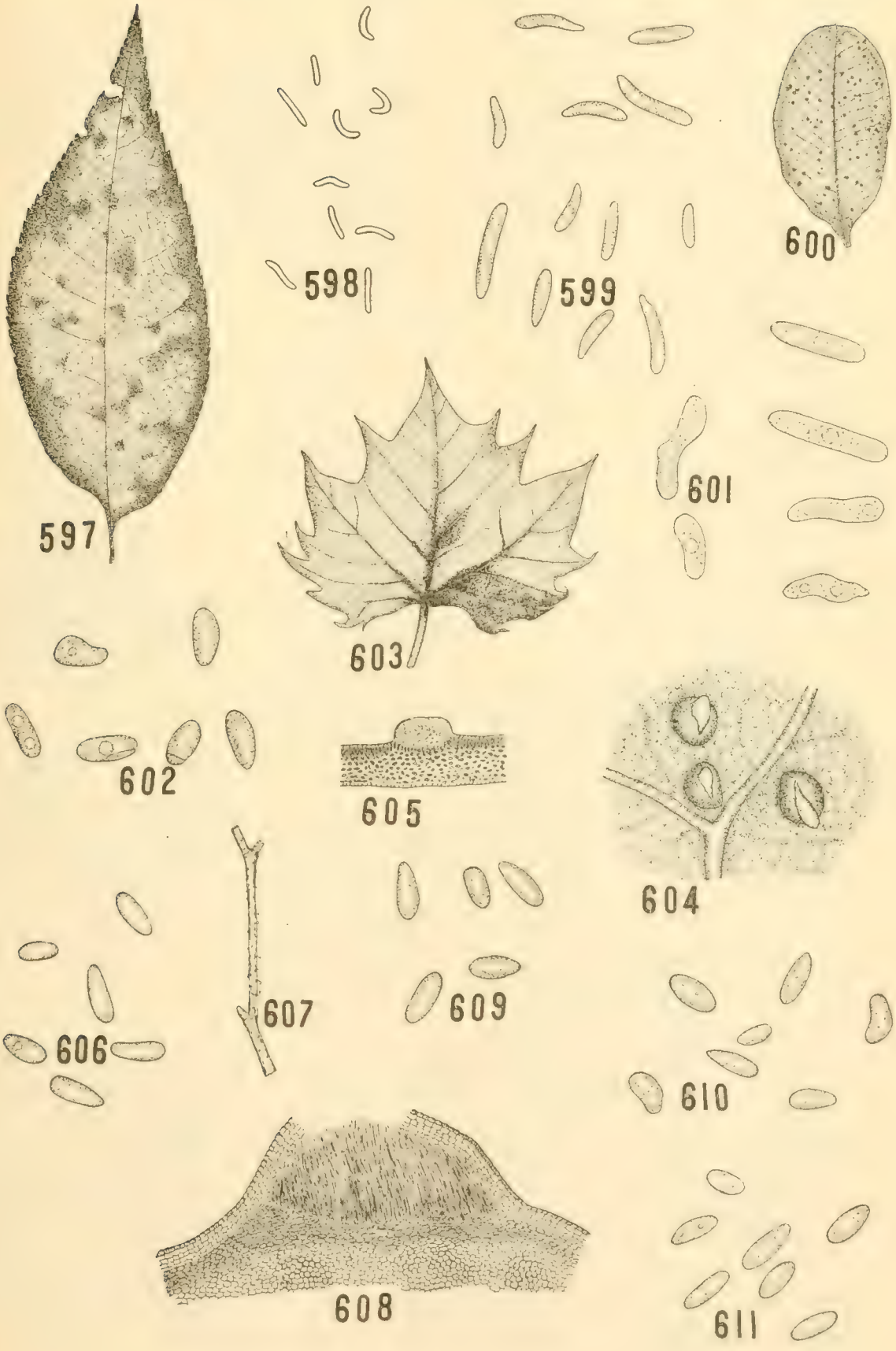
GLŒOSPORIUM CARYÆ E. & D. (= *Gnomonia caryæ* Wolf, page 58).—On the leaves of the hickory. Causes a spotting and blighting. Spots suborbicular, reddish-brown on lower surface, ½ cm. in diameter, frequently confluent with indefinite margins; acervuli on the lower surface, numerous, subcuticular, brown, 70-150 μ in diameter; conidia oblong, or allantoid, 1-celled, 7-10 x 1.5-2 μ. Spores develop in late summer or fall.

597. Infected hickory leaflet. 598. Spores, 1/12.

GLŒOSPORIUM CAULIVORUM Kirch.—On the stems of red clover. Causes peculiar cankers. Acervuli very small, punctiform, grouped, erumpent, more or less sunken; conidiophores cylindrical, stipitate and slightly longer than the conidia. Conidia, cylindrical to fusoid, straight or curved, ends obtuse or acute, hyaline, granular, 12-22 x 3.5-5.2 μ.

599. Spores, 1/12.

*Syn. *Leptostromella elastica* E. & E.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GLŒOSPORIUM FUSARIOIDES E. & K. (= *Glomerella fusarioides* Edgerton, page 58).—On leaves and stems of *Asclepias cornuti.* Causes numerous small spots. Acervuli numerous and variable. Spore masses on both surfaces of leaf but most abundant above. Spores hyaline, irregular, but mostly oblong and cylindrical, 18-27 x 4.5-6 μ.

600. Infected leaf of *Asclepias* sp. 601. Spores, 1/12.

GLŒOSPORIUM MUSARUM Cke. & Mass.—On the ripe fruit of the banana. Common on the markets. Causes spotting and rotting of the fruit. Acervuli grouped, erumpent, salmon-colored; conidia elongate-ellipsoid at both ends, non-septate, hyaline, 10-12 x 4 μ.

602. Spores, 1/12.

GLŒOSPORIUM NERVISEQUUM (Fcl.) Sacc. (= *Gnomonia veneta* (Sacc. & Speg.) Kelb., page 58).—On the leaves and twigs of the sycamore. Causes a blighting of the leaves and young shoots. Acervuli mostly on the upper surface of the leaf, near the nerves, compact, orbicular or nearly so, erumpent, black, 100-200 μ; conidia oozing out in creamy white mass, ellipsoidal, 10-14 x 4-6 μ.

603. Infected leaf of *Platanus occidentalus.* 604. Acervuli on same, 2/3. 605. Cross-section of same, 2/3. 606. Spores, 1/12. 607. Infected twig from same host showing spores tendrils, 2/3. 608. Cross-section through acervulus on twig, 2/3. 609. Spores, 1/12. 610. Conidia from leaf, 1/12. 611. Spores from oak leaf, 1/12.

GLŒOSPORIUM PIPERATUM E. & E. (= *Glomerella piperata* (E. & E.) S. & S., page 58).—Causes a soft rot, sunken areas on the fruit of the pepper. Acervuli pustular, concentrically grouped; conidia, 12-23 x 5-6 μ.

612. Acervuli, 2/3. 613. Conidiophores and immature conidia. 614. Spores, 1/12.

GLŒOSPORIUM POLYMORPHUM Tunchili (= *Glomerella cincta* (B. & C.) S. & S., page 58).—On the leaves of Dracaena species in greenhouses. Cause leaf spots, killing the greater part of the tip. Diseased parts brown, becoming ashy-colored, sometimes white, margin chestnut-colored. Acervuli densely grouped, convex, subrotund, covered by epidermis but becoming erumpent, black, 122-208 x 98-149 μ; spore tendrils orange-colored; conidia cylindrical or oblong, ends rounded, straight or very slightly curved, 1 to 3 or more guttulate, granular, hyaline, 14-23.3 x 4-6.6 μ.

615. Infected tip of leaf of *Dracaena fragrans* showing acervuli. 616. Acervuli and spores tendrils, 2/3. 617. Spores, 1/12.

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GLŒOSPORIUM RIBIS (Lib.) M. & D. (= *Pseudopeziza ribis* Kleb., page 22).—On the leaves of the currant and gooseberry, sometimes on petioles, young canes and fruits. Causes small, reddish-brown, sometimes coalescent, spots and finally the yellowing and falling of the leaves. Acervuli abundant on upper surface, and sometimes on lower surface, stromatic, sub-epidermal; conidia pinkish in gelatinous mass, hyaline, elliptical, curved, 12-24 x 5-9 μ.

618. Infected gooseberry leaf. 619. Infected currant leaf. 620. Part of same enlarged. 621. Spores, 1/12.

GLŒOSPORIUM RUFOMACULANS (Berk.) Thüm (= *Glomerella rufomaculans* (Berk.) S. & S., page 50).—On apple and other pomaceous plants. It also attacks grape, tomato, eggplant and other plants. Causes a brown, sunken, rotten area on the fruit from which the acervuli are developed. It also attacks the branches of the apple causing well-defined cankers. The acervuli on the fruit are prominent, arranged more or less in circles, and the emerging spores pinkish or orange-colored in mass, spores hyaline to greenish, unicellular, 28 x 3.5-7 μ. Perithecia more or less grouped on the fruit; asci sub-clavate, 55-70 μ; ascospores allantoid, 12-22 x 3-5 μ.

622. Acervulus, 2/3. 623. Spores, 1/12.

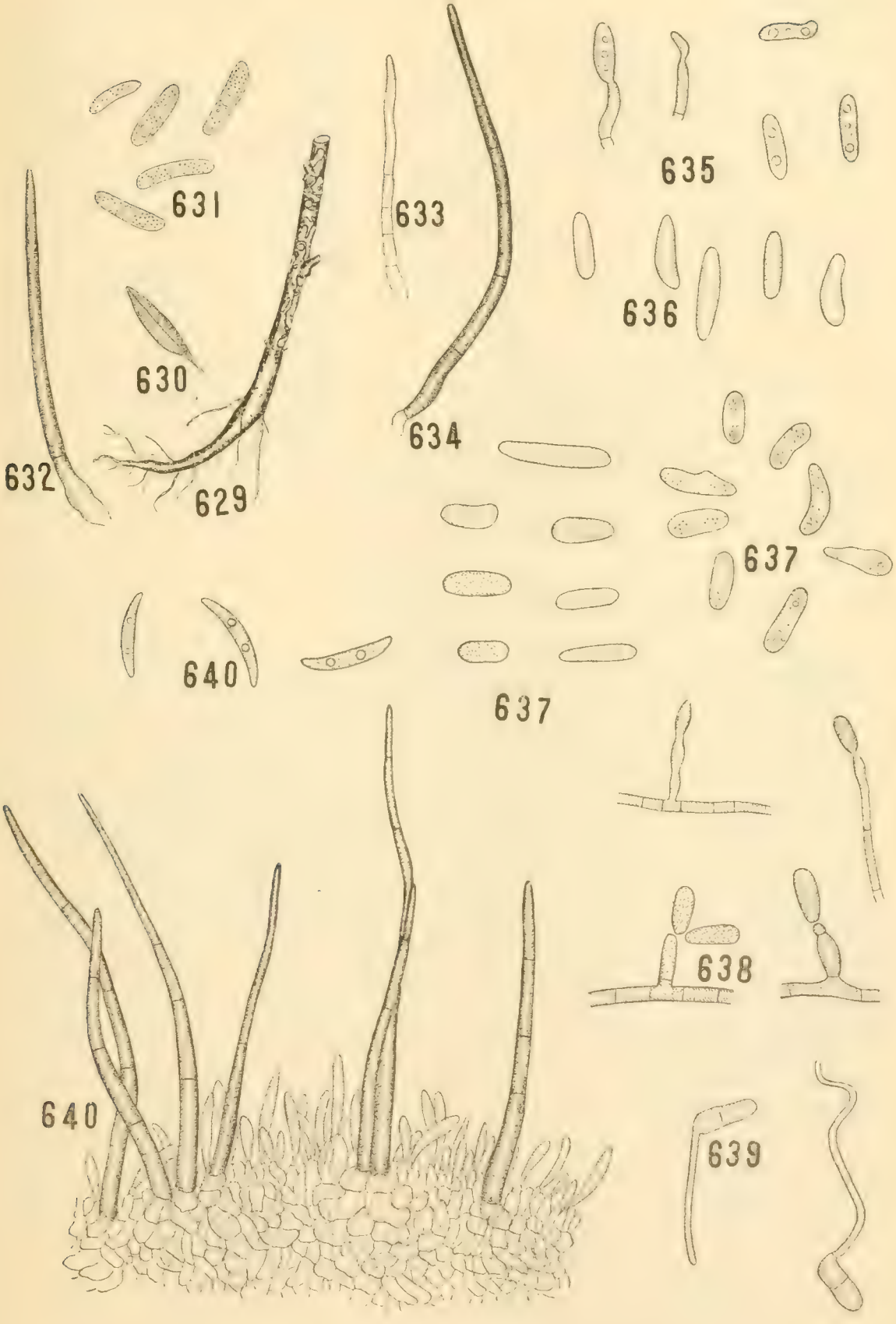
GLŒOSPORIUM SALICIS West (= *Pseudopeziza salicis,* page 22).—On the leaves of the willow. Causes small brown or black spots on the upper surface, frequently becoming confluent and causing defoliation. Acervuli abundant on the upper surface, spore tendrils white, spores oblong, non-septate, slightly curved, guttulate, hyaline, 11-15 x 4-6 μ.

624. Infected willow leaf. 625. Spores, 1/12.

GLŒOSPORIUM VENETUM Speg.—On the canes, petioles and leaves of species of Rubus. Causes more or less circular or elongated purplish spots, centers becoming gray and sunken, giving the bird's-eye effect, and mostly confluent, 2-3 mm. in diameter; conidia amber-colored in mass, oblong, elliptical, 5-7 x 3 μ. (= *Plectodiscella veneta* Burk. *In* Phytopathology, v. 7, p. 83-91, 1917.)

626. Infected dewberry cane. 627. Spores from black-cap raspberry, 1/12. 628. Spores from Welsh raspberry, 1/12.

COLLETOTRICHUM ANTIRRHINI Stewart.—On the stem and leaves of the cultivated snapdragons. Causes circular, elliptical, often confluent, dark brown spots, 3-10 x 3-5 μ. Acervuli numerous and grouped (especially on the stem); setæ abundant, especially on the stems, dark brown, unbranched, tapering, 50-100 μ long; conidia ob-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long, rounded at the ends, straight or slightly curved, granular prominent, central vacuole, 16-21 x 4 μ.

629. Infected stem of snapdragon. 630. Infected leaf of same. 631. Spores, 1/12. 632. Bristle, 1/12.

COLLETOTRICHUM CINCTUM *Ston.* (= *Glomerella cincta* (B. & C.) S. & S., page 52).—On leaves of orchids. Causes a spotting and, in severe cases, a dying of the foliage. Acervuli erumpent; conidia elliptical, 12-15 x 3-4 μ; septæ present.

633. Immature bristle, 1/12. 634. Mature bristle, 1/12. 635. Conidiophores and conidia, 1/12. 636. Spores from Catleya sp. 1/12.

COLLETOTRICHUM GLŒOSPORIOIDES Penz.—On shoots, leaves, flowers and fruit of citrus plants in greenhouses. Causes the "wither tip" on shoots, leaves and flowers and cankers on the fruits. Acervuli scattered, superepidermal, erumpent, dark, setæ, sparingly septate, dark-colored, 40-90 x 5-6 μ; conidia cylindrical with rounded ends, straight or occasionally slightly curved, 16-28 x 4-6 μ.

637. Spores, 1/12, from two sources. 638. Formation of spores on mycelium in culture, 1/12. 639. Germinating spores, 1/12.

COLLETOTRICHUM GRAMINICOLUM (Cesati) Wilson.*—Causes circular or ovoid spots on roots, stems, blades and spikes of rye, wheat, oats, barley, emmer, orchard grass, timothy, blue-grass and chess. Causes premature ripening and shrivelling of the grain. Diseased heads have very much the appearance of being attacked by scab (*Fusarium culmorum* Smith) except that there is no pink overgrowth. Acervuli dark-brown or black; setæ few or many, dark-brown or black, 1-2 septate, 60-120 μ in length and 6-8 μ thick at base; conidiophores very short, 12-6 x 1-2 μ; conidia spindle or boat-shaped, 2 to several guttulate, 18-26 x 3-4 μ.

640. Section through acervulus showing bristles and spores, 1/12.

COLLETOTRICHUM CYCLAMENÆ Hals. (= *Glomerella rufomaculans* var. *Cyclaminis* P. & C.).—On the leaves of Cyclamen in the greenhouse. Causes prominent spots. Acervuli on both surfaces of the leaves, brown; conidia oblong, linear, obovate, straight or slightly curved, ends rounded, 12-15 x 4-5 μ; conidiophores long, slender, setæ free, short, and rigid.

641. Bristle, 1/12. 642. Spores, 1/12.

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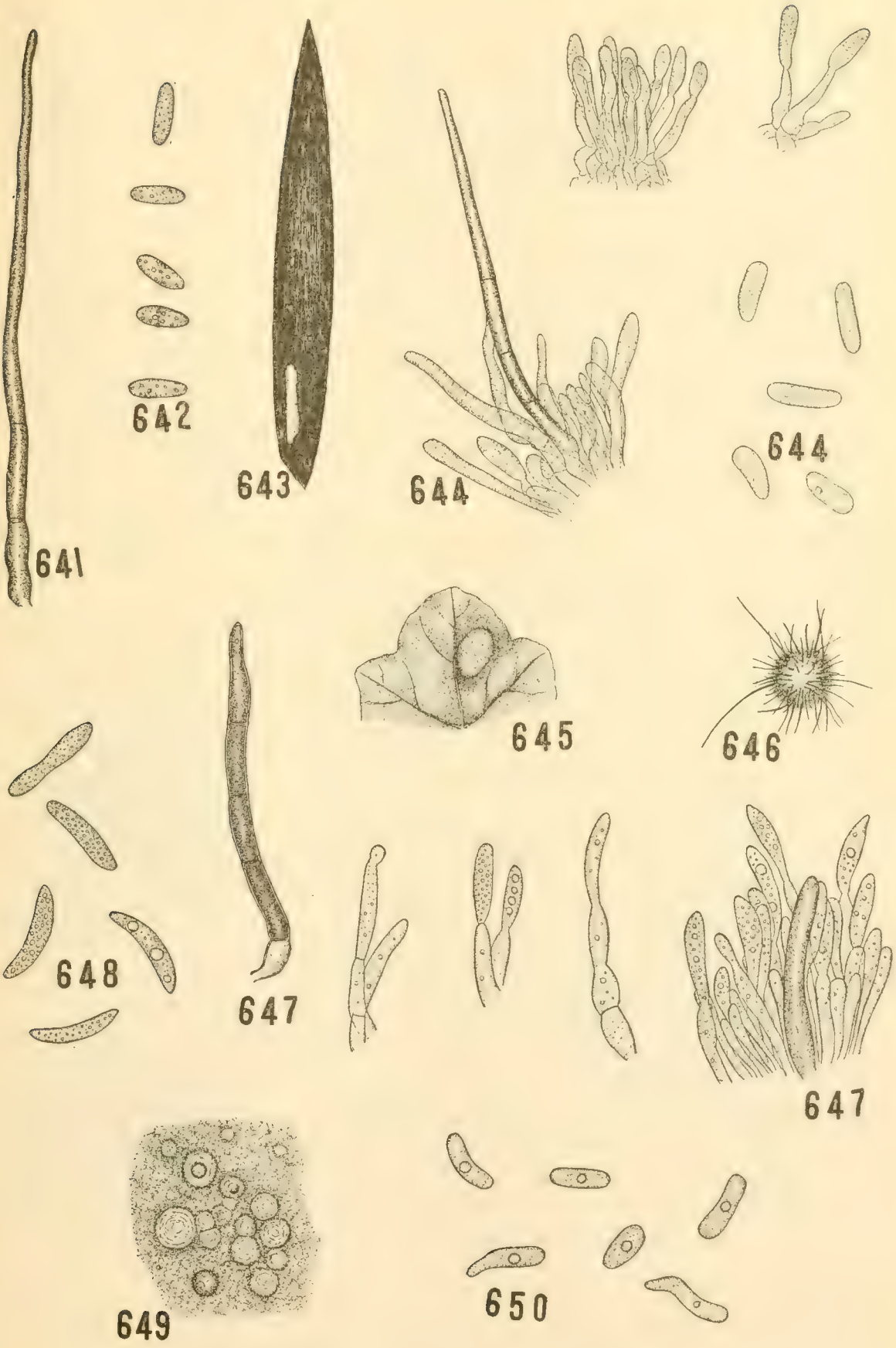
*Syn. *Colletotrichum cereale* Manus.
Colletotrichum sanguineum E. & H.
Colletotrichum fromi Jennings.
Colletotrichum lineola pachyspora E. & K.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COLLETOTRICHUM KENTIÆ Hals.—On the leaves of *Kentia fosteriana.* Causes more or less circular, more or less grayish-brown irregular spots with dark margins. Acervuli numerous on both surfaces of the leaf, epidermis forced up and ruptured by the growing fungus, spores, salmon-colored in mass, cylindrical rounded ends, straight or slightly curved, hyaline, 16.6-20 x 5-6 μ.

643. Infected leaflet of *Kentia fosteriana.* 644. Conidiophores, bristles and spores, 1/12.

COLLETOTRICHUM HEDERICOLA Laub.—On the living leaves, rarely on petioles and branches of *Hedera helix.* Oval or circular brown spot about 15 mm. in diameter on both surfaces of the leaves. Acervuli on both surfaces, gregarious; setæ straight or curved, septate, 7 μ broad at base, sometimes as much as 140 μ in length; conidia 1-celled, hyaline oblong or subfusiform slightly curved, usually guttulate, 17-26.6 x 3.3-3.5 μ.

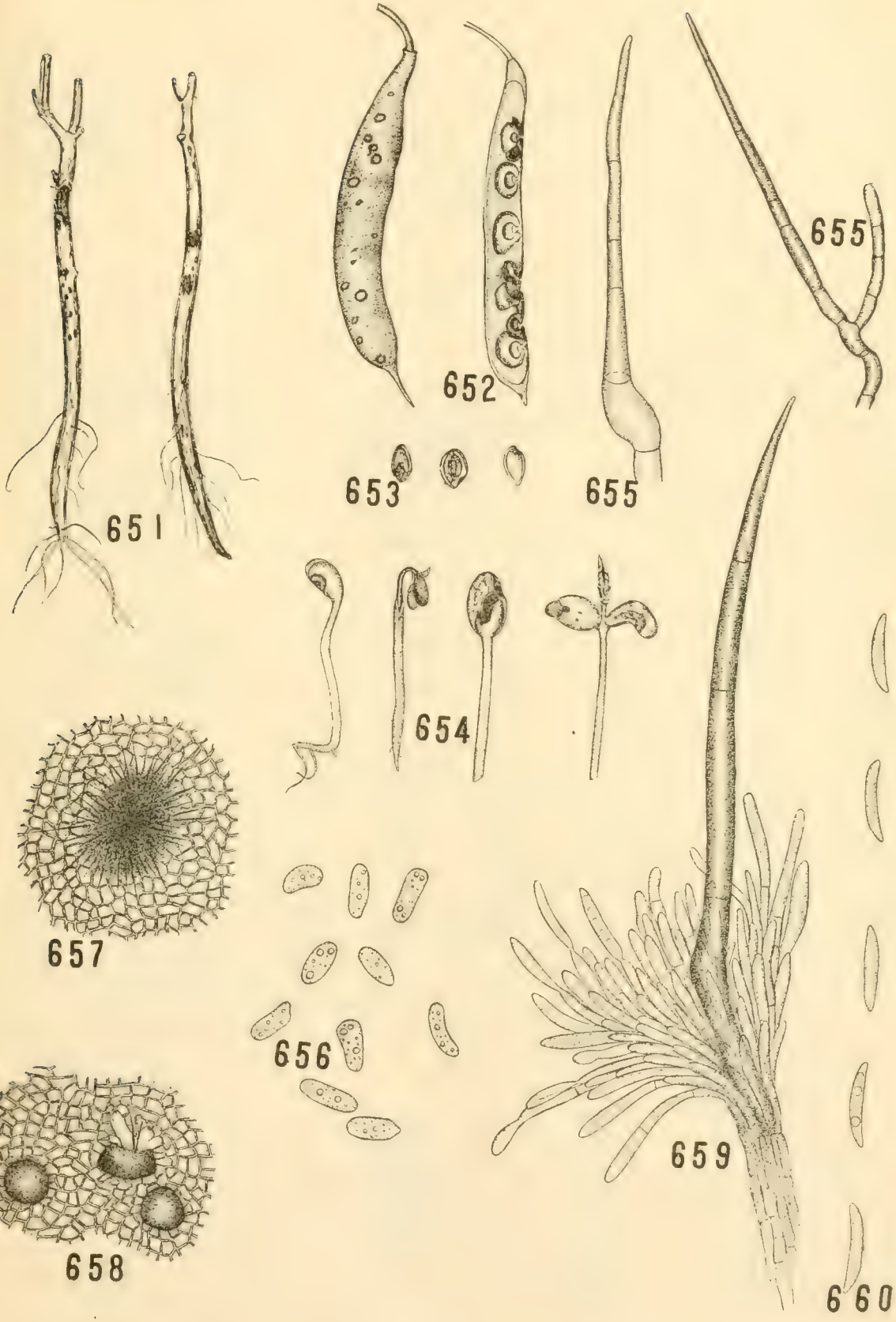
645. Portion of leaf of *Hedera helix* showing spot. 646. Acervulus, 2/3 647. Conidiophores, bristles and spores, 1/12. 648. Mature spores, 1/12.

COLLETOTRICHUM LAGENARIUM (Pers.) E. & H.—Causes spots on the fruit and leaves of watermelons, cucumbers, squash, pumpkins and citrons. Causes brown spots on the leaves and in severe cases an early maturity; causes water-soaked, sunken spots on fruit which develop into rotten areas of various sizes containing numerous acervuli. Spore mass prominent and pink in color. Conidia variable in size and shape, hyaline. There is considerable evidence to indicate that this is really *Colletotrichum lindemuthianum.*

649. Spots on fruit of watermelon. 650. Spores, 1/12.

COLLETOTRICHUM LINDEMUTHIANUM (Sacc. & Mg.) B. & C.—On the stems, leaves, pods and seeds of the bean, causing elongated, black spots or streaks on the stems, which become somewhat sunken and pinkish during exudation of spores; causing similar spots on petioles and veins of leaves; causing small, dark-colored more or less circular spots on pods becoming large, sunken and pinkish with spore formation and frequently uniting into unsightly canker-like areas; causing yellowish, brownish or blackish spots on seeds. Acervuli scattered and surrounded by few, rather inconspicuous black setæ, conidiophores cylindric, simple, 45-55 μ. Conidia oblong, ends rounded, 15-19 x 3.5-5.5 μ.

651. Infected root and stem of bean. 652. Infected pods. 653. Cross-section through infected pods. 654. Infected seedlings. 655. Bristles, 1/12. 656. Spores, 1/12.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COLLETOTRICHUM NIGRUM. E. & H.—On the pods of the pepper. Causes black, sunken spots and is followed by decay. The seed are frequently affected with the fungus. Acervuli numerous, superficial and on both outside and inside of the pods; setæ numerous, black, long, pointed, 3- or 4-septate; conidia oblong, somewhat curved, acutely pointed, 18.2-26.6 x 3-3.3 μ.

657. Acervulus showing bristles, 2/3. 658. Acervulus showing emerging spores, 2/3. 659. Conidiophores, spores and bristles, 1/12. 660. Spores, 1/12.

COLLETOTRICHUM OMNIVORUM Hals.—On leaves of *Aspidistra* and other plants. Causes spots which are dry, irregular gray with yellowish margins, gradually spreading and frequently destroying the entire leaf. Setæ numerous (Halsted says "few"), black, prominent, pointed; conidia hyaline, usually slightly curved, 20-28 x 3-5 μ.

661. Spot on leaf of *Aspidistra* sp. 662. Bristles, 2/3. 663. Spores, 1/12.

COLLETOTRICHUM PHOMOIDES (Sacc.) Ches.—On the fruit of the tomato. Causes circular, depressed, water-soaked spots which vary in size and become blackish, unite and finally rot the entire fruit. Acervuli abundant, grouped, brown or black, 95 to 150 μ; setæ numerous, dark, usually curved, septate, 65-112 μ; conidiophores short, slender, 30-40 μ in length; conidia oblong with rounded ends, 16-24 x 4 μ.

664. Infected fruit of tomato. 665 Acervulus showing bristles, 2/3. 666. Bristles, 1/12. 667 and 668. Spores from different sources, 1/12.

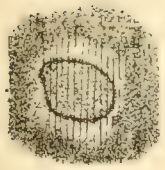
COLLETOTRICHUM RUBICOLUM E. & E. (= *Glomerella rubicola* (Ston.) E. & E., page 52).

COLLETOTRICHUM TRIFOLII Bain.—On the stems and occasionally on the leaves of clover and alfalfa. Causes more or less elongated, dark, sunken spots. Acervuli scattered or grouped; erumpent; setæ few or many, usually septate, dark, with light-colored tips; conidiophores cylindric or fusoid and hyaline; conidia pinkish in mass, more or less oblong, 3-4 x 11-13 μ.

669. Spots on infected stem of *Trifolium* sp. 670. Bristles, 1/12. 671. Spores, 1/12.

COLLETOTRICHUM VIOLÆ-TRICOLORIS R. E. Smith.—On the leaves and blossoms of the pansy. Causes small, yellowish, often confluent spots with distinct black margins. Acervuli numerous 50-150 μ in diameter; setæ solitary or in twos, brownish, 1-3 septate, 20-70 μ long, tapering to a blunt tip; conidia oblong, rounded at the end, sometimes slightly curved, granular, guttulate, 20 x 5 μ.

672. Infected pansy leaf. 673. Bristle, 1/12. 674. Spores, 1/12.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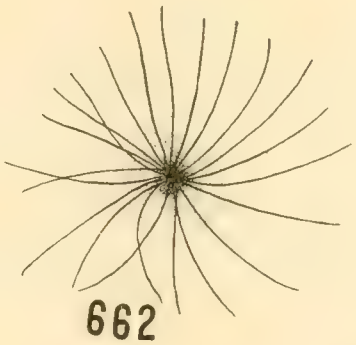
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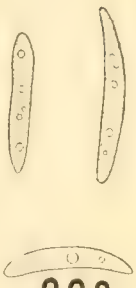
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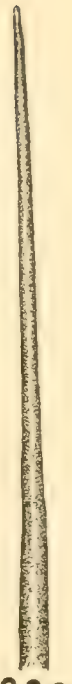
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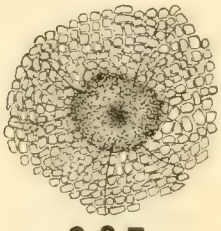
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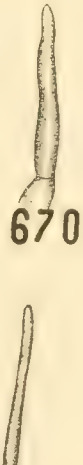
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MELANCONIUM FULIGINEUM (S. & V.) Cav.—On the ripening fruit of the grape. We have also found it very abundant on the very small green berries, and pedicles in June. Causes a bitter rot of ripe berries and dying of young berries and pedicles. Acervuli scattered or grouped, grayish-cinereous, becoming brownish, subepidermal, erumpent; conidiophores filiform, conidia ovoid to ellipsoid or very much elongated, rounded or pointed, olive-colored, 9-12 x 4-6 μ.

675. Cross-section of acervulus from fruit of grape, 2/3. 676. Conidiophores and conidia from different sources, 1/12. 677. Germinating conidia, 1/12.

MARSSONIA BRUNNEA† (E. & E.) Sacc.—On the leaves of *Populus candicans*. Causes numerous, small black spots which become confluent, especially around the margins. Acervuli on both surfaces of the leaf, 1-3 in each spot, pale, becoming black, erumpent; conidia clavate, hyaline, 1-septate; the two cells of unequal size, 14-16 x 5-7 μ.

678. Spores, 1/12.

MARSSONIA JUGLANDIS (Lib.) Sacc. (= *Gnomonia leptostyla* C. & d. Not., page 58).—On the leaves of the walnut. Causes black spots of irregular shape and size. Acervuli grouped on under surface of the leaf; conidia ovoid, pointed at one end, truncate at the other, slightly greenish in color, 1-septate, 8-10 x 4-5 μ.

679. Infected leaflets of walnut. 680. Cross-section of acervulus, 2/3. 681. Conidiophores and conidia, 1/12. 682. Conidia, 1/12.

MARSSONIA MARTINI Sacc. & Ell.—On the leaves of *Quercus alba*. Causes small, ochre-colored spots on both surfaces of the leaf. Acervuli in the under surface, globose, somewhat amber-colored; conidia fusiform, slightly curved, acute at both ends, 1-septate, slightly constricted, hyaline, 12-15 x 2.5-4 μ.

683. Spores, 1/12.

MARSSONIA OCHROLEUCA* B. & C.—On the leaves of the chestnut. Causes small pale brown or ashy-colored, circular, or oval, occasionally confluent spots surrounded by narrow dark margins, 2-3 mm. in diameter. Acervuli on under surface, few (1 to 5), pale, in center of spots; spores hyaline, crescent-shaped ends slightly pointed, 1-septate, 20-25 x 2.5-3 μ, oozing out in an amber-colored mass.

684. Infected leaf of chestnut (*Castanea dentata*). 685. Spores from leaf of *C. dentata*, 1/12. 686. Spores from leaf of *C. vesca*, 1/12.

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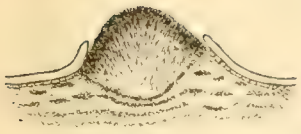
†This genus has been recently changed to *Marssonina*.

*Syn. *Septoria ochroleuca*.



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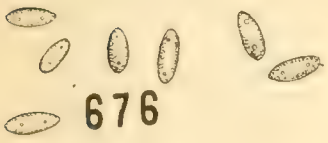

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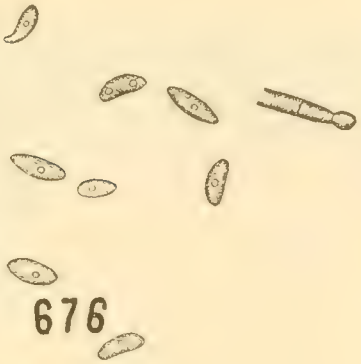

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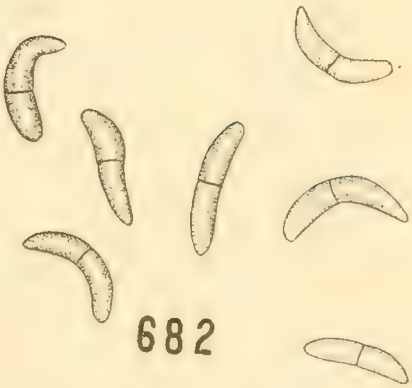

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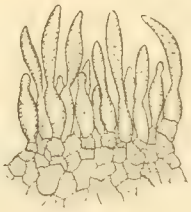

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MARSSONIA POPULI (Lib.) Sacc.—On the leaves of the *Populus*. Causes a spotting and a blighting of the leaves and lateral shoots. Spots suborbicular with dark margins and frequently uniting, acervuli on the upper surface, yellow or flattened; conidiophores branched and septate; conidia hyaline, unequally 2-celled, constricted at the septum, 14.9-20.0 x 5.5-7.7 μ. (Saccardo says "20 x 12.")

687. Infected leaf of *Populus alba.* 688. Acervulus showing conidiophores and spores, 1/12. 689. Conidia from *Populus deltoides,* 1/12. 690. Conidiophores and conidia from *P. alba.*

MARSSONIA POTENTILLÆ (Desm.) Fisch., var. *fragariæ* Sacc.—On the leaves of the strawberry. Causes small, ochre-colored or reddish spots with indefinite outline or reddish margins. Acervuli dark, conidia irregular, 1-septate, cells unequal in size, 18 x 5-6 μ.

691. Infected strawberry leaflet. 692. Conidia, 1/12.

MARSSONIA RHABDOSPORA E. & E.—On the leaves of *Populus grandidentata.* Causes spots visible on both surfaces. Acervuli on the under surface of the leaf, flesh-colored, erumpent; conidia cylindrical, slightly curved, 1-septate, hyaline, 20-30 x 2 μ.

693. Spores from *Populus grandidentata,* 1/12.

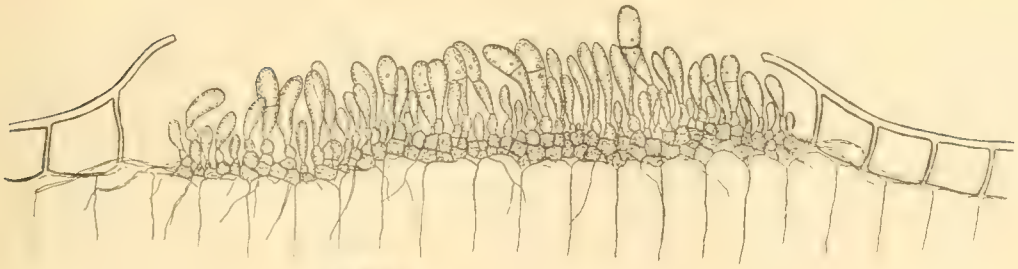
MONOCHAETIA MALI (E. & E.) Sacc.—On the leaves of the apple. Causes small, circular white or cream-colored spots with reddish-brown margins and about 1-3 mm. in diameter. Acervuli innate, erumpent, sublenticular; conidia cylindrical, 5 or 6 septate, sometimes constricted, 20-25 x 6-7 μ, brown, apical, and basal cells, conical and hyaline.

694. Infected apple leaf. 695. Acervulus, 2/3. 696. Conidiophores from hanging-drop culture, 1/6. 697. Spores, 1/6. 698. Spores, 1/12. 699. Germinating spores, 1/6.

PESTALOZZIA GUEPINI Desm.—On sunburnt leaves of Rhododendron. Acervuli minute, convex, dark; conidia fusiform, 3-4 septate, 20 μ long, inner cells brown to olive-colored, terminal cells cone-shaped and hyaline, basal cell hyaline and with 3 or 4 appendages.

700. Conidia, 1/12.

PESTALOZZIA GUEPINI var. *vaccinii* Shear.—On the leaves and sometimes on the fruit of the cranberry. Causes a rotting of the fruit which is not easily distinguished from rots due to other organisms. Acervuli scattered, subepidermal, spores emerging in dark



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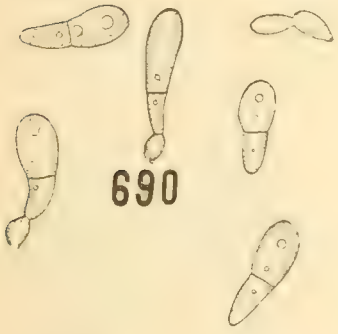

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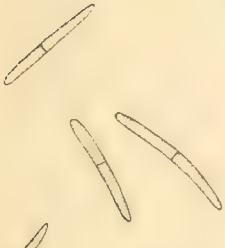

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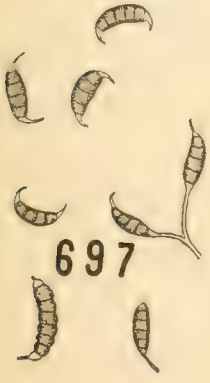

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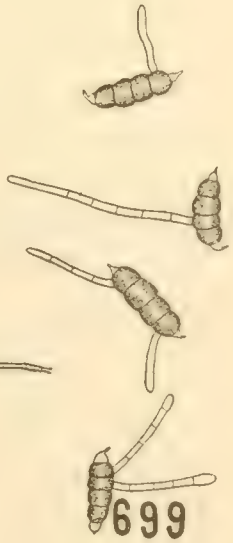

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masses and spreading over the surface, elliptical, somewhat inequilateral, usually 4-septate, the three central cells dark-colored, usually guttulate, terminal cells hyaline; apical cell with 3 or 4 filiform setæ, varying from 22 to 35 μ in length; basal cell with a short hyaline appendage 6-12 μ in length.

701. Conidia, 1/12.

PESTALOZZIA ROSÆ West.—On the dying twigs of cultivated roses. Apparently a secondary parasite. Acervuli minute, white, dense; conidia fusiform, smoky to olive-colored, 4-septate, 20-26.6 x 5-6.6 μ, terminal cell cone-shaped and hyaline, basal cell hyaline and with 2 appendages.

702. Conidia, 1/12.

CYLINDROSPORIUM PADI. Karst.—On the leaves of the wild and cultivated cherry and occasionally on the fruit of the wild cherry. Causes reddish-brown circular, angular, or irregular spots visible on both surfaces, frequently falling away and giving the "shot hole" effect; pycnidia subepidermal; spores yellowish-tinged, curved, 1-septate, 48-60 x 2 μ.

Note: Higgins [Amer. Jour. Bot. v., 1, p. 145-173 (1914)] says that it is not known that *C. padi* occurs in America. He describes three American species of this genus, with perfect stages belonging to *Coccomyces.* Since the *Cylindrosporium* stages of these three species are so nearly alike we prefer to use the *C. padi* until exact determinations can be made.

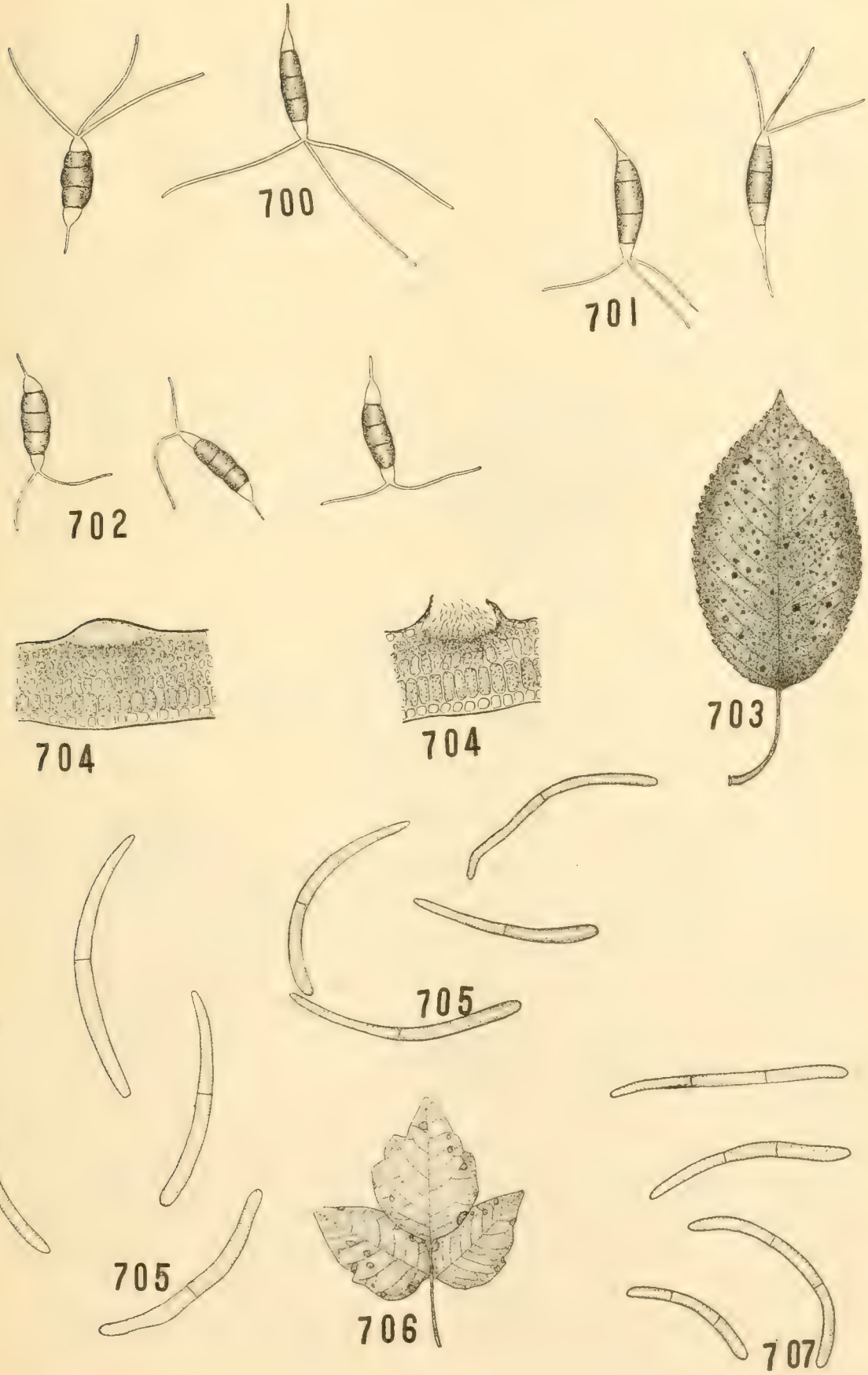
703. Infected cherry leaf. 704. Cross-section of acervulus. 2/3. 705. Conidia from two sources, 1/12.

CYLINDROSPORIUM TOXICODENDRI* (Curtis) Dearness — On the living leaves of *Rhus toxicodendron* and other species of Rhus. Causes irregular dark brown spots, with irregular darker borders, visible on both surfaces. Acervuli scattered, convex, black; conidia cylindrical, straight or curved, non-septate or 1-3 septate, hyaline, 21-78 x 3-5 μ.

706. Infected leaf of *Rhus radicans.* 707. Conidia 1/12.

MONILIA FRUCTIGENA. Pers. (= *Sclerotinia fructigena* (Pers.) Schr., page 22).

*Syn. *Septoria toxicodendri* Curtis.
Glœosporium toxicodendri E. & M.
Septoria toxicodendri (Curtis) E. & M.
Marssonina toxicodendri Magn.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OIDIUM FRAGARIÆ Harz. (= *Sphærotheca humuli* (D. E.) Burr, page 32).

OIDIUM LEUCOCONIUM Desm. (= *Sphærotheca pannosa* (Wallr.) Lev., page 32).

OIDIUM AMBROSIÆ Thüm. (= *Erysiphe cichoracearum* D. C., page 26).

OIDIUM MONILIOIDES Link (= *Erysiphe graminis* D. C., page 26).

OIDIUM TUCKERI Berk. (= *Uncinula necator* (Schw.) Burr., page 32).

OIDIUM CRATÆGI Grogn. (= *Podosphæra oxyacanthae* (D. C.) DeBary, page 30).

SPOROTRICHUM POÆ Peck.—On carnations. Causes a rotting of the buds. Hyphæ hyaline, creeping cottony, branched, septate, 2.5-6 μ in diameter; micro-conidia elongate-elliptic to ovate-elliptic, usually, 1-septate, occasionally more, 3 or 4 times as large as the micro-conidia. This organism is carried from plant to plant by a mite (*Pediculoidus dianthophilus*).

708. Mycelium and spores, 1/12.

BOTRYTIS PARASITICA Cav.—On tulip buds. Causes a rot. Hyphæ ashy-colored, sparse, erect, branching, inflated at base; conidia large, usually ovate, but more or less irregular, pedicillate, heads umbellate, hyaline to slightly ashy, 16-20 x 12-13 μ.

709. Conidiophores and conidia from tulip, 2/3. 710. Conidia, 1/12.

BOTRYTIS VULGARIS* Fr.—On cultivated Primula. Causes a dying of the leaves. Hyphæ, slender, septate, branched, erect, ashy or olive-gray; conidia globose, smooth, hyaline or pale, 10-1 x 7-9 μ.

711. Infected leaf of *Primula* sp. 712. Conidiophores and conidia from same, 2/3. 713. Conidia, 1/12. 714. Conidiophores and conidia from rose, 2/3. 715. Swollen tip of branchlet of conidiophore showing conidia attached, 1/6. 716. Conidia from lettuce, 1/12. 717. Conidiophores from lettuce, 2/3. 718. Spores, 1/12.

CEPHALOTHECIUM ROSEUM Cda.—On scab spots on fruit of the apple and also on many other hosts. Causes the so-called "pink rot." Spots whitish or pinkish; conidiophores erect, unbranched, non-septate, hyaline; conidia oblong-ovate, 2-celled and constructed at the septum.

719. Conidiophores and conidia, 1/6. 720. Conidiophores and conidia, 1/12.

*Syn. *B. cinerea* Pers.

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SEPTOCYLINDRIUM AROMATICUM Sacc.—On the leaves of *Acorus calamus*. Causes oblong, somewhat irregular, brown spots on both surfaces of the leaf. Conidiophores fasciculate, short, white, conidia cylindrical, rounded at the ends, denticulate at one end, hyaline, non-septate or 1 to 3-septate, not constricted, 35-50 x 2-3 μ.

721. Infected tip of leaf of *Acorus calamus*. 722. Conidiophores and conidia, 1/12.

SEPTOCYLINDRIUM CONCOMITANS (Ell. & Hals.) Hals.—On the leaves of *Bidens frondosa*. Causes oval or irregular, pale brown spots with purplish border which is more prominent on upper than lower surface, 2-4 mm. in diameter. Conidiophores fasciculate, short; conidia cylindrical with acute ends, non-septate or 1-2 septate, 15-22 x 3-4 μ.

723. Infected leaf of *Bidens frondosa*. 724. Conidiophores and conidia, 1/12.

RAMULARIA ARMORACEÆ Fcl. — On the leaves of horse-radish. Causes subochraceous spots which become gray with age. Conidiophores fasciculate, continuous, sub-simple, 40-50 x 2.5-3 μ; conidia rod-shaped, obtuse, hyaline, 15-20 x 3-4 μ.

725. Conidiophores and spores, 1/12.

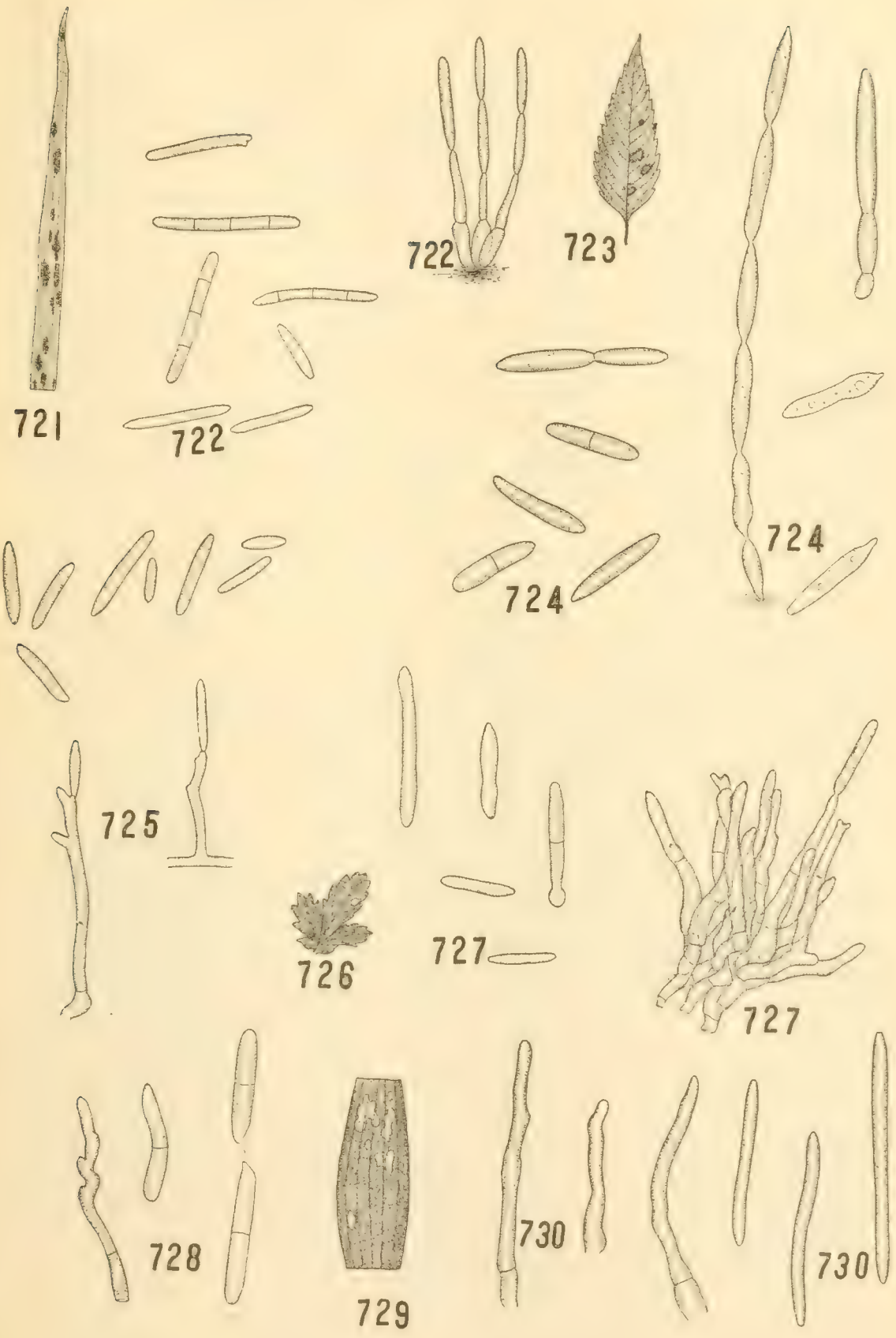
RAMULARIA ARVENSIS Sacc.—On the leaves of *Potentilla monspeliensis*. Causes small, subcircular, white spots with reddish margins. Conidiophores fasciculate, denticulate, 1-septate, hyaline; conidia more or less cylindrical, sometimes wavy in outline, one end sometimes swollen or knobbed, non-septate or 1-septate, 22-26 x 2-5.4 μ.

726. Infected leaf of *Potentilla monspeliensis*. 727. Conidiophores and conidia, 1/12.

RAMULARIA DESMODII Cke.—On the leaves of *Meibomia*. Causes pale yellow spots. Conidiophores primarily in irregular patches, limited by the veinlets, non-septate or 1-2 septate, hyaline, 50-80 x 3-4 μ; conidia oblong or clavate-oblong, straight or slightly curved, 1-, rarely 2- or 3- septate, hyaline, 12-24 x 3.5-4 μ.

728. Conidiophores and conidia, 1/12.

RAMULARIA PLANTAGINIS E. & M.—On the leaves of *Plantago lanceolata*. Causes small, circular or irregular, grayish, frequently white spots, with reddish or purple margins. Conidiophores fasciculate, somewhat wavy, sometimes branched, non-septate, hyaline, 35-40 x 3-3.5 μ, conidia cylindrical, non-septate or 1-2 septate, 15-38 x 4 μ.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729. Part of infected leaf of *Plantago lanceolata.* 730. Conidiophores and conidia, 1/12.

RAMULARIA TARAXACI Karst.—On the leaves of *Taraxacum taraxacum.* Causes grayish-brown circular spots with purple margins on both surfaces of the leaves and shows concentric circles. Conidiophores borne in tufts on the under surface of the leaf, branched, non-septate, hyaline, 35-45 x 2-3 μ; conidia cylindrical, usually 1-celled, occasionally 1-septate, hyaline, 18-30 x 2-3 μ.

731. Part of infected leaf of *Taraxacum taraxacum.* 732. Conidia, 1/12.

RAMULARIA TULASNEI Sacc. (= *Mycosphærella fragariæ* (Tul.) Lin., page 44). — On leaves of strawberry. Causes white or gray, more or less circular spots with broad dark-red margins. Conidiophores cylindrical, non-septate, hyaline, 30 x 3-4 μ; conidia cylindrical, non-septate or 1-2 septate, hyaline, 20-35 x 3.5-4.5 μ.

733. Infected strawberry leaflet. 734. Conidia, 1/12.

PIRICULARIA GRISEA (Cke.) Sacc.—On leaves and stems of grasses. Causes grayish or ashy-colored spots. Conidiophores rise from stomata in clusters of 2 or 5, grayish in color, septate, simple, occasionally sparingly branched; conidia single, terminal in scorpioid cymes, ovate, 2-septate, 24-29 x 10-12 μ.

Very similar to *P. oryzae* Br. & Cav. which causes the rice blast.

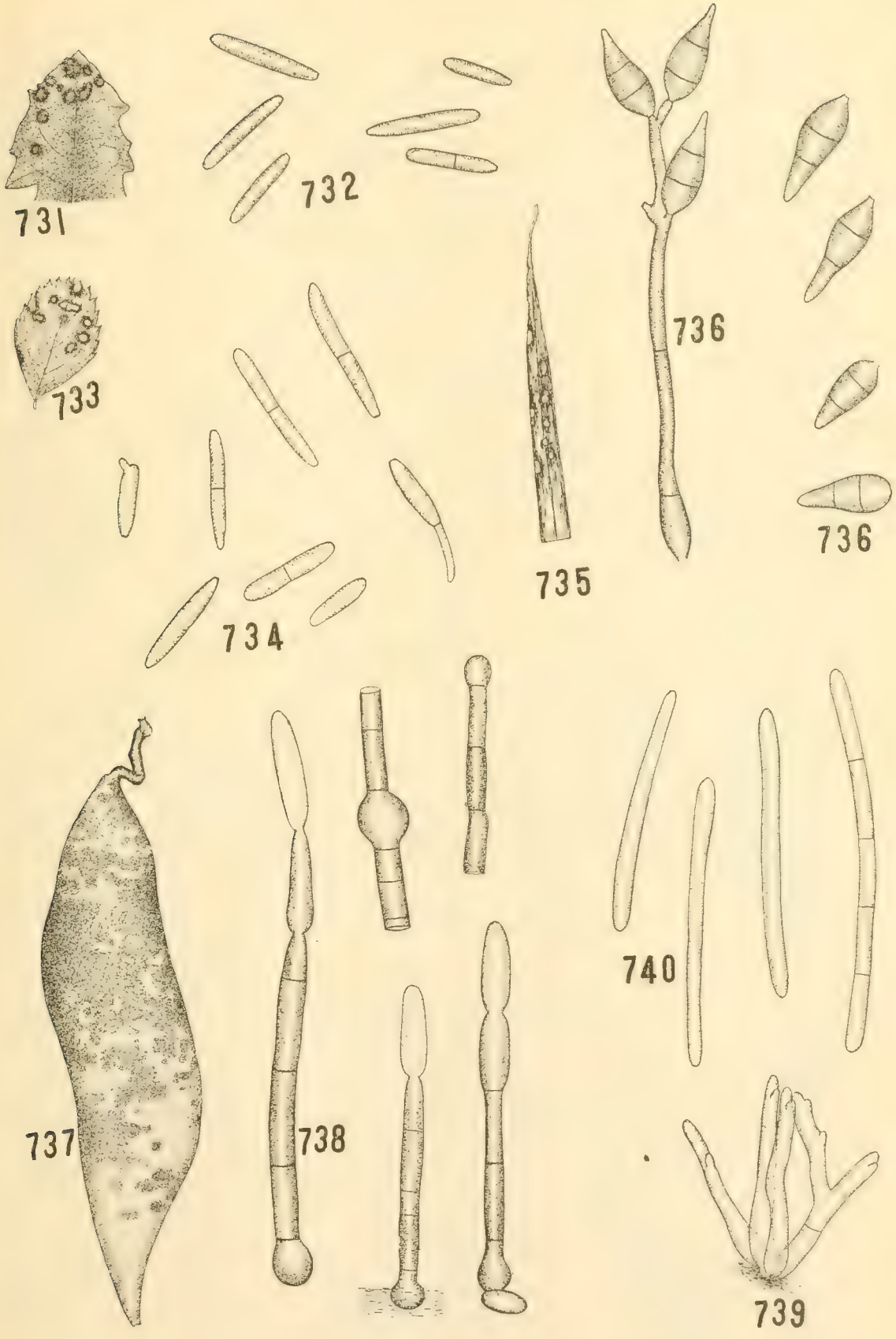
735. Infected leaf of grass. 736. Conidiophores and conidia, 1/12.

MONILOCHÆTES INFUSCANS E. & H.—On the fleshy roots of the sweet potato. Causes peculiar dark discolorations. Conidiophores attached to host singly or by twos by a bulb-like enlargement, erect, unbranched; septate, dark, 40-175 x 4-6 μ; conidiospores unicellular oblong, hyaline, 12-20 x 4-7 μ.

737. Infected root of sweet potato. 738. Conidiophores showing swollen cells and conidia, 1/12.

CERCOSPORELLA CANA (Pass.) Sacc.—On leaves of *Erigeron canadensis.* Causes whitish spots. Conidiophores on the under side of the leaf, cylindrical, occasionally septate, short, obtusely branched. Conidia cylindric obclavate, 3-4 septate when mature, minutely guttulate, slightly curved, hyaline, 60-90 x 4-5 μ.

739. Conidiophores, 1/12. 740. Conidia, 1/12.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CLADOSPORIUM CARPOPHILUM Thüm.—On fruit, foliage and twigs of peaches, plums, nectarines and cherry. Causes the scab or freckles. Fungus grows on surface of fruit, causing small, circular, blackish, occasionally confluent spots on the surface of the fruit. It also attacks the twigs, causing a cracking of the cuticle and also causes "shot holes" in the foliage. The conidiophores are erect, simple, sinuous, septate; conidia, ovate, obtuse, continuous or 1-septate, 10-12 x 4-6 μ.

741. Infected peach. 742. Conidiophores and conidia, 1/12.

CLADOSPORIUM FULVUM Cke.—On the leaves and fruit of the tomato, in the greenhouse and sometimes in the field. Causes a dense white or grayish to brownish mold on the under surface of the leaves, and in severe cases on the upper surface, and a rotting of the fruit. Upper surface of the leaf yellow. Conidiophores rupturing the cuticle, dense, sparingly branched, septate nodulose; conidia few, elliptic to oblong, 1-4 septate, translucent, tawny, 10-20 x 4 μ.

743. Infected tomato leaf. 744. Conidiophores, 1/12. 745. Conidia, 1/12.

CLADOSPORIUM HERBARUM (Pers.) Lk. (= *Mycosphærella tulasnei* Jarz.).—On the maturing heads of wheat. Causes a dense, velvety black growth over the glumes; conidiophores erect, septate, rarely branched, often nodose or keeled; conidia often in chains of 2 or 3, more or less cylindrical with rounded ends, pale olive-green, 1-3 septate, 10-15 x 4.7 μ.

746. Infected head of wheat. 747. Conidiophores, 1/12. 748. Spores, 1/12.

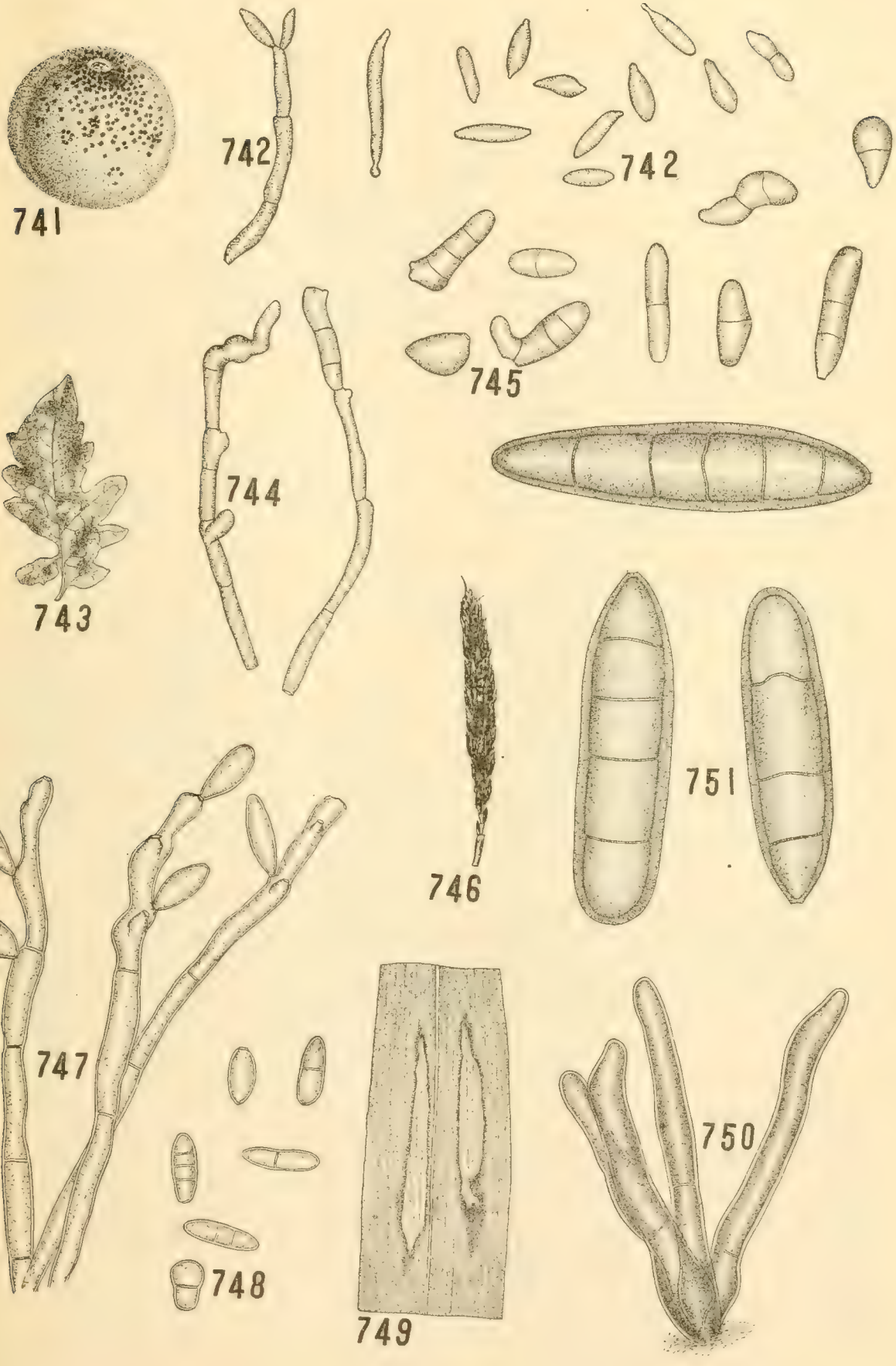
HELMINTHOSPORIUM INCONSPICUUM C. & E.—On corn leaves. Causes peculiar large, elongated, brownish blotches, frequently surrounded by a broad reddish-border. Hyphæ elongated, septate, nodulose, pale brown; conidia lanceolate, thick-walled, 3-5 septate, 80-120 x 20 μ. An *Alternaria* sp. is frequently present on the larger and older spots.

749. Part of infected leaf of corn. 750. Conidiophores, 1/12. 751. Conidia, 1/12.

POLYTHRINCIUM TRIFOLII Ktze. (= *Phyllachora trifolii* (Pers.) Fcl., page 42).

FUSICLADIUM DENDRITICUM (Wal.) Fcl. (= *Venturia inæqualis*, page 48).

FUSICLADIUM PIRINUM (Lib.) Fcl. (= *Venturia pirina*, page 48).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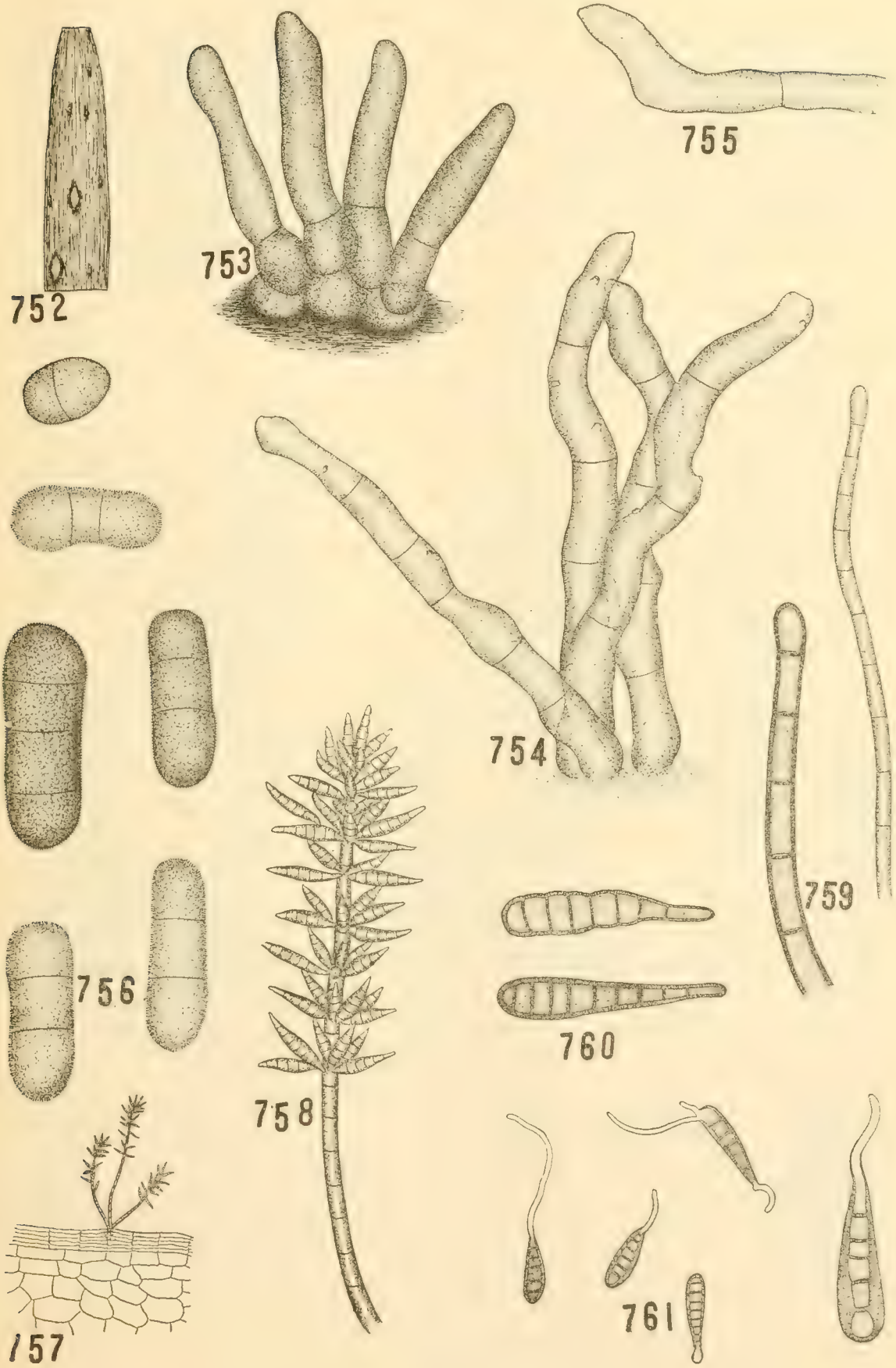
HETEROSPORIUM GRACILE (Wal.) Sacc.—On leaves of *Iris* sp. and *Hemerocallis fulva* and other monocotyledons. Causes elliptical, light brown spots with brown or purple borders. Conodiophores brown to olive green, septate, nodulose, 70-170 x 9-11 μ; conidia cylindrical, echinulate, brown to olive-green, 1-3 septate, 30-80 x 13-23 μ.

752. Infected part of Iris leaf. 753. Immature coniodiophores, 1/12. 754. Mature conidiophores, 1/12. 755. Tip of conidiophores, 1/12. 756. Conidia, 1/12.

SPONDYLOCLADIUM ATROVIRENS. Harz.—On the tubers of the potato. Causes blackish or olive-colored, slightly depressed spots about 2-3 cm. in diameter, followed by a dry rot. Conidiophores solitary or in cluster, septate but not constricted, olive or brownish; conidia elongate, ovate, apex narrow, walls thick, 5-9 septate, may or may not be constricted, same color as conidiophores, 30-50 x 6-13.3 μ.

757. Section of potato showing conidiophores and conidia on surface, 2/3. 758. Conidiophore and conidia, 1/6. 759. Conidiophore, 1/6, 1/12. 760. Conidia, 1/12. 761. Germinating spores, 1/6, 1/12.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MACROSPORIUM CUCUMERINUM E. & E.—On the leaves of cucumbers and muskmelons. Causes orbicular, sometimes confluent, rusty-colored or whitish spots about 3-4 mm. in diameter. Conidiophores solitary or fascicled, brown, flexuous, somewhat branched, 1-8 septate, 57-140 x 5-9 μ in length, 5-9 μ in diameter at base and 4.6 μ in diameter at tip; conidia numerous, club-shaped, brown, multi-septate, 57-81 x 11-24 μ, with long beak having a hyaline tip.

762. Infected leaf of *Cucumis melo*. 763. Conidium, 1/12.

MACROSPORIUM HERCULEUM E. & M.—On leaves of turnips, horse-radish and other crucifers. Causes gray to brown spots. Conidiophores erect, fexuose, few septate, 70-80 x 5 μ; conidia brown, multi-septate, clavate, 139.8-225 x 18.2-23 μ.

764. Spots on portion of turnip leaf. 765. Conidium, 1/12.

ALTERNARIA ABUTILONIS* Speg.—On the leaves of *Abutilon abutilon*. Causes irregular brown spots visible on both surfaces of the leaf. Conidiophores branched, smoky to hyaline; conidia club-shaped, muriform, pale yellowish to smoky, 5-7 septate, 50-9 x 10-15 μ.

766. Conidium, 1/12.

ALTERNARIA BRASSICÆ (Berk.) Sacc.—On the leaves of cabbage, collards and other crucifers; causing black mold. Conidia clavate, 5-11 septate, 50-60 x 12-14 μ.

767. Conidia, 1/6, 1/12.

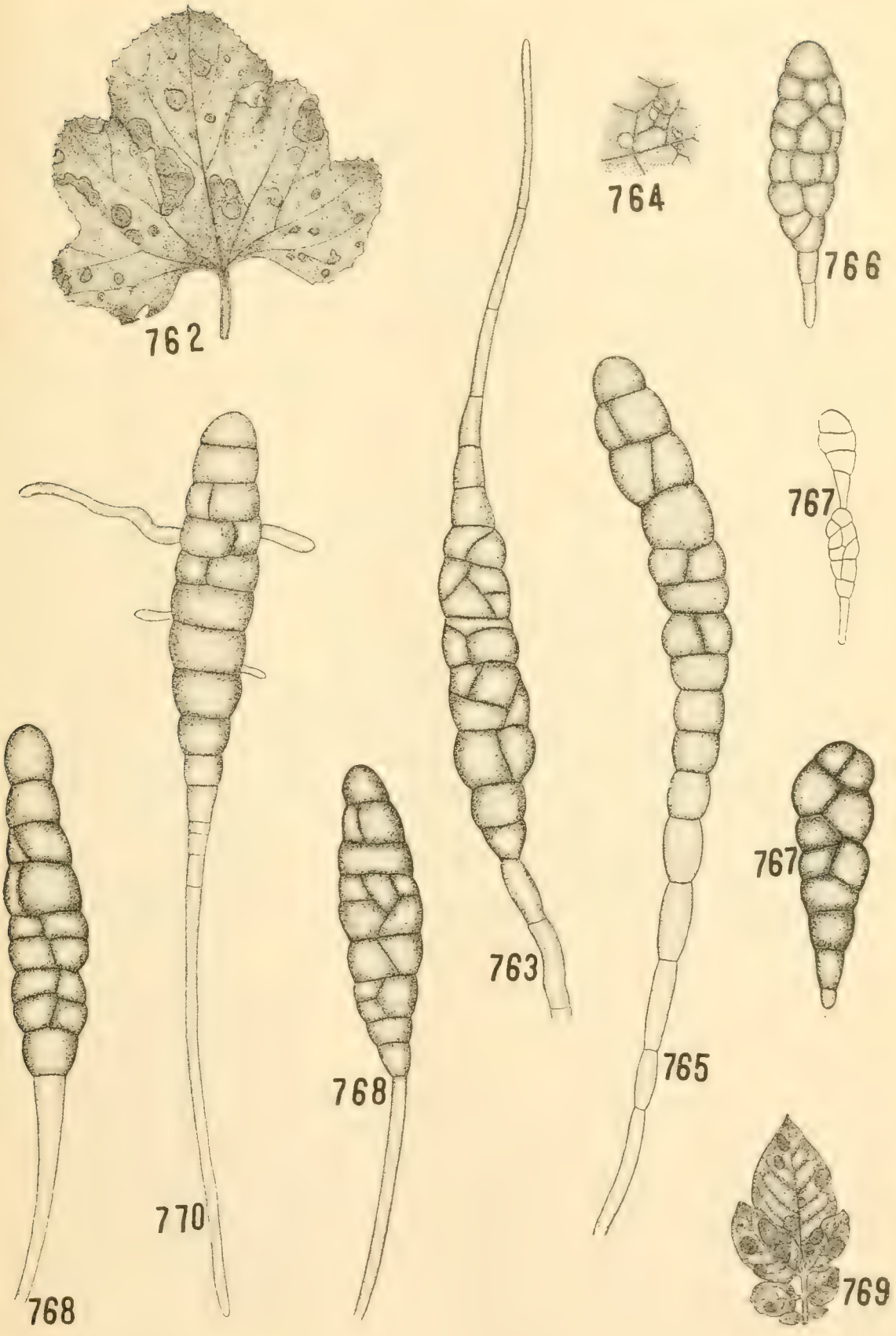
ALTERNARIA CUCURBITÆ Let.—On the leaves of cucumbers and melons. Causes circular spots which frequently become confluent and cover the entire leaf. Conidiophores short, straight, brown; conidia multi-cellular, clavate, olive-colored, 60-68 x 8-9 μ.

768. Conidia, 1/12.

ALTERNARIA SOLANI (E. & M.) Jones & Grout.—On the leaves of the potato and tomato. Causes brown, more or less circular, concentrically-zonated spots. Conidiophores septate, 50-90 x 8-9 μ; conidia obclavate, brown, transverse septa numerous, longitudinal septa few, beak long, hyaline, 145-370 x 16-18 μ.

769. Infected potato leaf. 770. Germinating conidium, 1/12.

*Syn. *Macrosporium abutilonis*.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CERCOSPORA ACALYPHÆ Peck.—On the leaves of *acalypha virginica.* Causes small, very thin, circular, white spots with narrow purplish-brown borders. Conidiophores fasciculate, septate, brown, 54-75 x 5 μ; conidia cylindrical, attenuated at distal end, 5-8 septate, hyaline, 50-100 x 3 μ.

771. Infected leaf of *Acalypha virginica.* 772. Conidiophore and conidium, 1/12.

CERCOSPORA AGERATOIDES E. & E.—On *Eupatorium album, E. ageratoides, etc.* Causes brown, subangular spots bounded by veinlets, becoming confluent, 1-3 mm.; conidiophores in tufts, brown, unbranched, septate, 50-90 x 4 μ; conidia cylindrical or lanceolate, 1-6 septate, 40-75 x 3.5-5 μ.

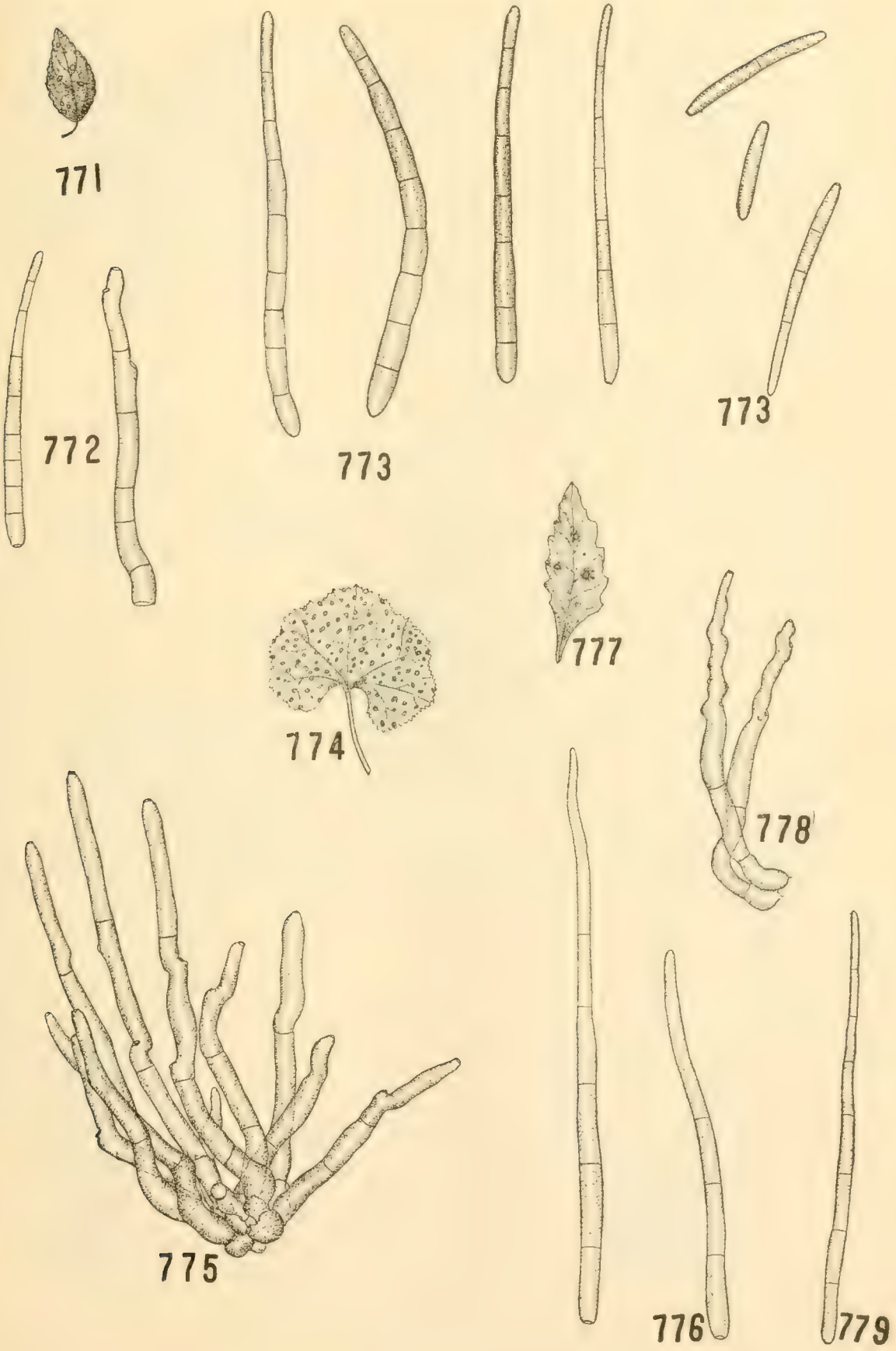
773. Conidia, 1/12.

CERCOSPORA ALTHÆINA Sacc.—On leaves and stem of hollyhock and some other *Malvaceæ,* causing brown spots. Conidiophores, olive brown, fasciculate, slender, few-septate, 40 x 5 μ; conidia apical, hyaline, cylindric to obclavate or broadly fusoid, straight, apically obtuse, 2-9 septate, 40-60 x 5 μ.

774. Infected leaf of *Malva* sp. 775. Conidiophores, 1/12. 776. Conidia, 1/12.

CERCOSPORA ANTHELMINTICA Atk.—On the leaves of *Chenopodium ambrosioides* var. *anthelminticum.* Causes small, light brown, circular spots with broad reddish border, 1-3 mm. in diameter. Conidiophores fasciculate, dentate, septate, almost hyaline, 30-100 x 4-4.5 μ; conidia cylindrical, septate, hyaline, 25-100 x 4-4.5 μ.

777. Infected leaf of *Chenopodium ambrosiodes* var. *anthelminticum.* 778. Conidiophores, 1/12. 779. Conidium, 1/12.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CERCOSPORA APII Fr.—On the leaves of celery, parsnips, etc. Causes a serious leaf-spot disease. Spots on any part of the leaf, mostly at apex, at base of main serrations, or at side of basal portion of the leaf; varies in character with location and humidity, yellowish, becoming large and ashy-gray, frequently surrounded by a halo of yellow, often becoming confluent. Spots on petioles greenish-gray, elongating in the direction of the axis. Conidiophores on both surfaces of the leaf, fascicled, light brown, subundulate, non-septate or 1- or 2-septate, 40-100.4 x 4-7.5 μ; conidia hyaline, or light brown, clavate or slightly curved towards apex, 3-16 septate, 50-215.7 x 4-7.7 μ.

(Written from notes by Mr. W. S. Krout.)

780. Infected leaflet of celery. 781. Conidia, 1/12.

CERCOSPORA ARMORACEÆ Sacc.—On leaves of horse-radish. Causes pale spots on both surfaces of leaves. Conidiophores short, simple, septate, 30-40 x 5 μ; conidia long and tapering, hyaline, many septate when mature, 100-120 x 5 μ.

782. Part of infected leaf of horse-radish. 783. Conidiophores, 1/12. 784. Conidia, 1/12.

CERCOSPORA BETICOLA Sacc.—On the leaves of the beets and chard. Causes brownish, purple-bordered spots which develop ashy centers with age. Conidiophores fasciculate, short, erect, non-septate, 35-55 x 4-5 μ; conidia long, filiform, obclavate, multi-septate, hyaline, 75-200 x 3.5-4 μ.

785. Part of infected leaf of beet. 786. Conidiophores and conidia, 1/12. 787. Conidia, 1/12.

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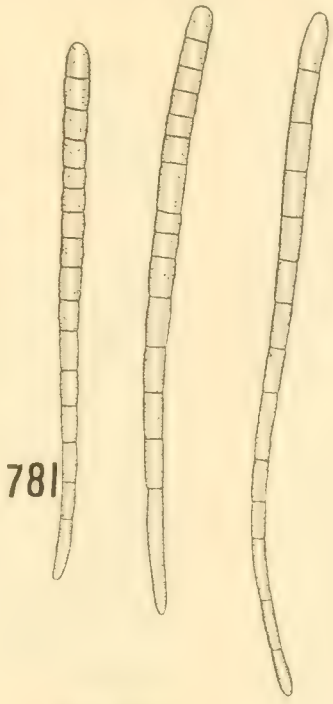
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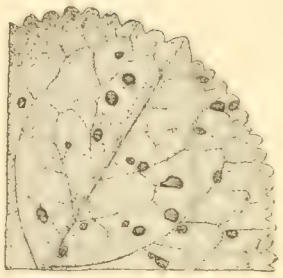
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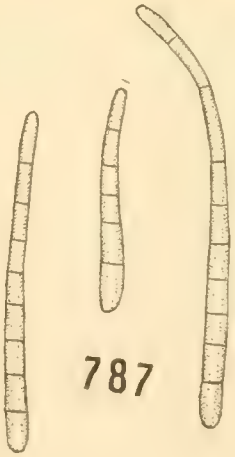
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CERCOSPORA CANESCENS E. & M.—On the leaves of garden beans. Causes broad, irregular brown spots with yellowish-brown borders; conidiophores brown; conidia hyaline, cylindric-clavate, 5-many septate, 117 x 6 μ.

788. Conidia, 1/12.

CERCOSPORA CERCIDICOLA Ell.—On the leaves of the American red bud (*Cercis canadensis*). Causes spots with dark, raised margins which are dull gray above and rusty brown below. Conidiophores fasciculate, brown, wavy, multi-septate, 90-114 x 3.5-4 μ; conidia clavate, 3-septate, 30-40 x 4-7 μ.

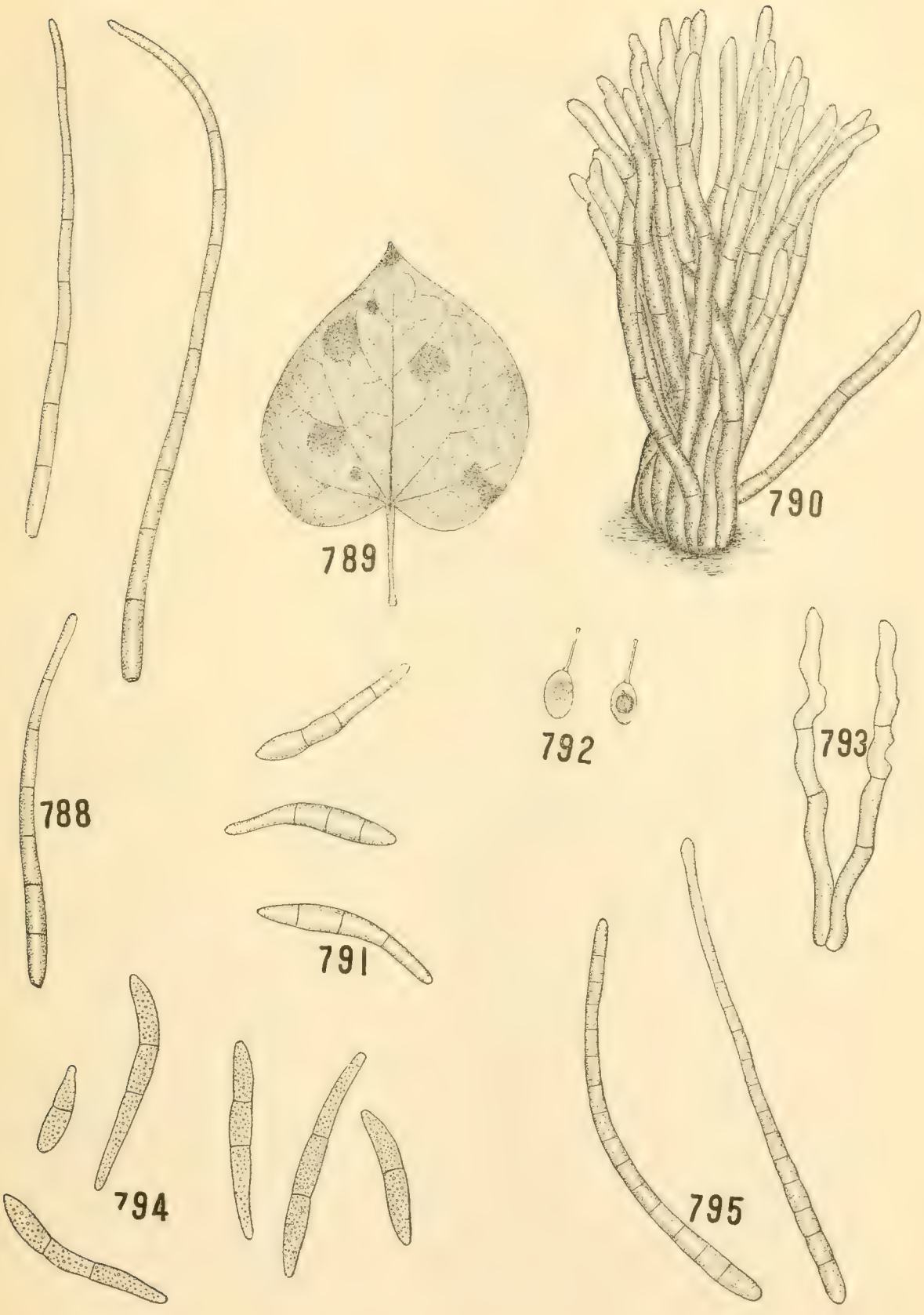
789. Infected leaf of *Cercis canadensis*. 790. Conidiophores, 1/12. 791. Conidia, 1/12.

CERCOSPORA CHIONANTHI E. & E.—On the fruit of *Chionanthus virginica*. Also reported on the leaves. Causes a rotting and shrivelling of the fruit and spotting of the leaves. Conidiophores fasciculate, brown, septate, geniculate at distal end or somewhat wavy, 75-150 x 3.5-5 μ; conidia fusoid or club-shaped, dark at maturity 3-5 septate, 30-60 x 4.4-5 μ.

792. Infected fruits of *Chionanthus virginica*. 793. Conidiophores, 1/12. 794. Conidia, 1/12.

CERCOSPORA CITRULLINA Cke.—On citron leaves. Causes numerous circular, brown spots 2-4 mm. in diameter with purple borders. Conidiophores on upper surface of leaf, long, pale olivaceous; conidia long, tapering, multi-septate (Saccardo says "sparsely septate"), hyaline, 120-140 x 3 μ.

795. Conidia, 1/12.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CERCOSPORA CIRCUMSCISSA Sacc.—On the leaves of peach, cherry and other drupaceous fruits. Causes circular, frequently confluent, dry spots which break and fall out, leaving a characteristic "shot hole." Conidiophores fasciculate, straight or flexuous, brownish, non-septate or occasionally 1-septate, conidia clavate, brown, usually, 3-septate, 50 x 3.5-4 μ.

796. Infected leaf of peach. 797. Infected leaf of *Prunus serotina*. 798. Conidiophores, 1/12. 799. Conidia, 1/12.

CERCOSPORA CLAVATA (Ger.) Peck.—On the leaves of the milkweed (*Asclepias cornuti*). Causes numerous minute, irregular often confluent spots. Conidiophores densely fasciculate, light brown, non-septate, 26-38 μ long; conidia elongated, clavate, usually curved, 1-10 septate, 35-75 x 5 μ.

800. Conidia, 1/12.

CERCOSPORA CRUENTA Sacc.—On the leaves and stems of cowpeas and beans. Causes reddish spots. Conidiophores fasciculate, pale olivaceous, non-septate; conidia long and tapering, hyaline becoming olivaceous, multi-septate, 60-80 x 4 μ.

801. Conidia, 1/12.

CERCOSPORA DIODIÆ Cke.—On leaves of *Diodia teres*. Causes orbicular leaf spots. Conidiophores on the under surface of the leaf, fasciculate, erect, septate, dark or olivaceous, 60-80 μ long; conidia long and tapering, septate, 60 x 4-4.5 μ.

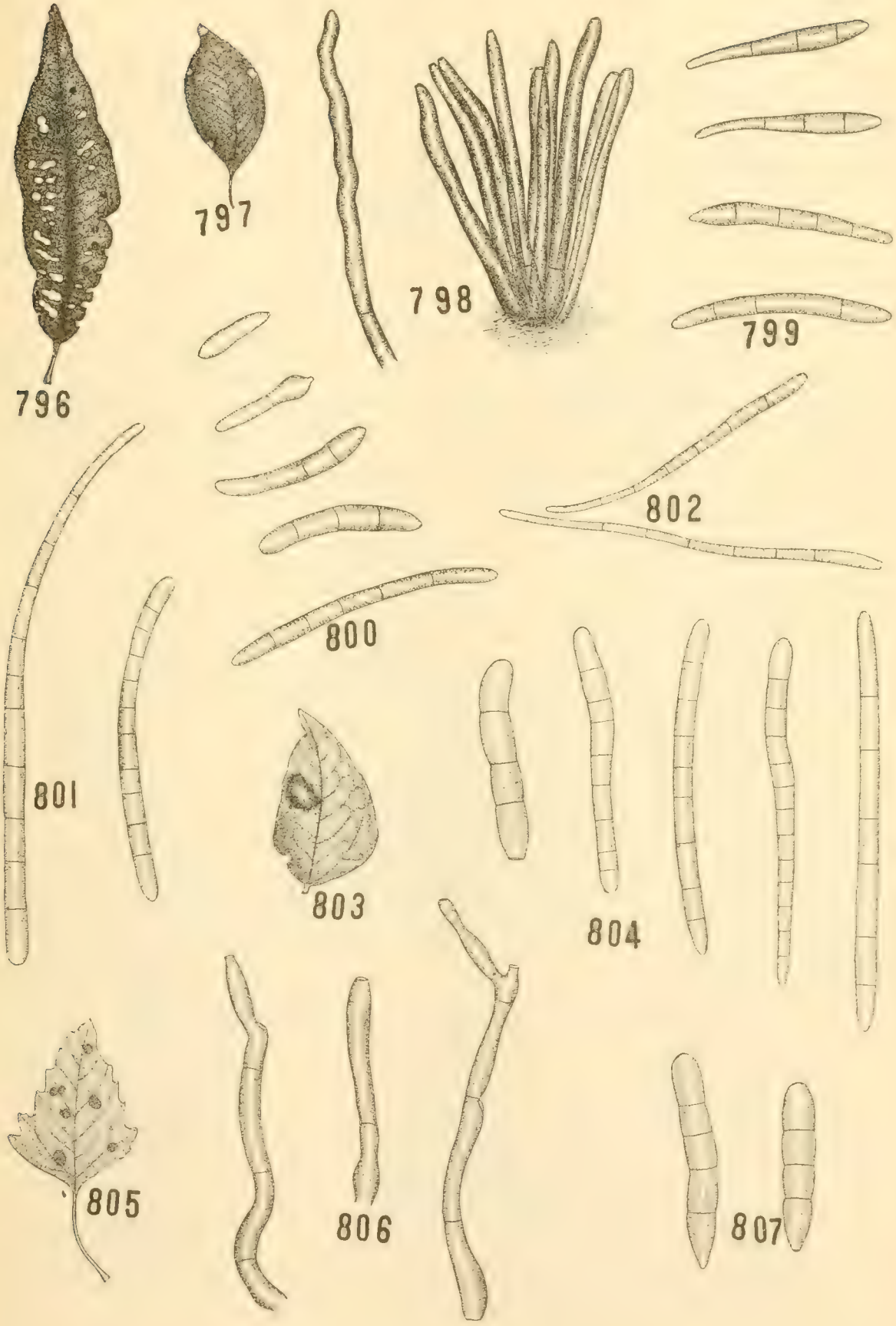
802. Conidia, 1/12.

CERCOSPORA DOLICHII E. & E.—On the leaves of cowpea. Causes reddish-brown spots becoming gray in centers. Conidiophores fasciculate, tubercular at base, indistinctly septate, olivaceous, 20-35 x 4-5 μ; conidia, slender, obclavate, multi-septate, 50-100 x 3.5-4 μ.

803. Infected leaflet of cowpea. 804. Conidia, 1/12.

CERCOSPORA DUBIA (Riess) Wint.—On leaves of *Chenopodium album*. Causes more or less circular spots of various sizes. Conidiophores on both surfaces, fasciculate, usually unbranched, may or may not be septate, sooty-colored, 40-45 x 5-6 μ; conidia cylindrical, somewhat fusoid, obtuse at one end, more or less pointed at the other, frequently slightly curved, hyaline or slightly colored, 4-5 septate, 60-70 x 8-9 μ.

805. Infected leaf of *Chenopodium album*. 806. Conidiophores, 1/12. 807 Conidia, 1/12.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CERCOSPORA GRANULIFORMIS Ell. & Holw.—On the leaves and petiole of *Viola cucullata*. Causes more or less circular spots about 1 cm. in diameter with somewhat indefinite margins. Conidiophores densely compact, brown, non-septate, nearly straight, becoming undulate, 15-25 x 3 μ; conidia cylindrical, straight, brown, 1-6 septate, 17-85 x 2½-3 μ.

808. Infected violet leaf. 809. Conidiophores, 1/12. 810. Conidia, 1/12.

CERCOSPORA ILICIS Ell.—On leaves of *Ilex glabra*. Causes small brown spots, about 2-3 mm., with narrow slightly elevated margins. Conidiophores on both surfaces of leaf, slightly branched, septate, 50-70 μ long; conidia guttulate, cylindrical, hyaline, 1-3 septate, 35-50 μ long.

811. Infected leaf of *Ilex glabra*. 812. Conidiophores, 1/12. 813. Conidium, 1/12.

CERCOSPORA MAGNOLIÆ E. & Hark.—On the leaves of *Magnolia glauca*. Causes very small suborbicular spots visible on both surfaces of the leaf. Conidiophores on both surfaces fasciculate, hyaline to dark brown, septate, 25-40 μ. Conidia obclavate, 3-5 septate, 20-40 μ long.

814. Part of infected magnolia leaf. 815. Conidia, 1/12.

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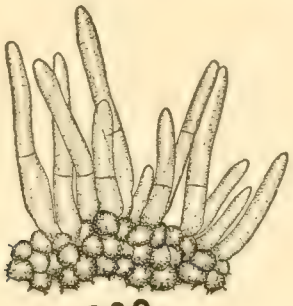
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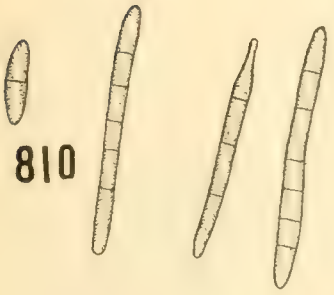
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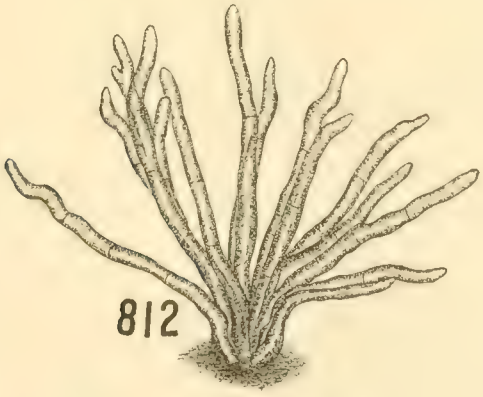
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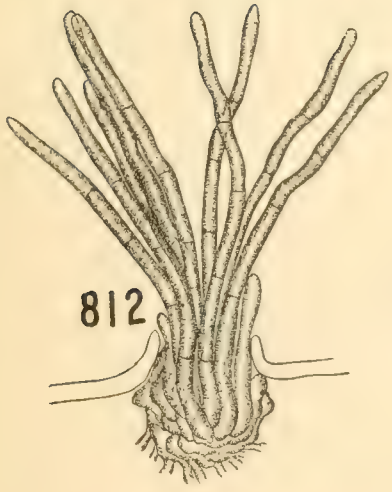
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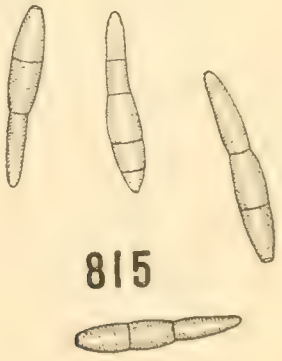
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CERCOSPORA MEDICAGINIS E. & E.—On the leaves of alfalfa, and red and crimson clovers. Causes orbicular, more or less indefinite smoky or black spots, 3-5 mm. in diameter on both surfaces of the leaf. Conidiophores on both surfaces, crowded on upper surface, subhyaline becoming yellowish-brown, septate, 35-45 x 4-5 μ; conidia cylindrical tapering, 3-8 septate, 40-60 x 3 μ.

Note: Septa on conidia from clover fewer and farther apart.

816. Infected alfalfa leaf. 817. Conidiophores, 1/12. 818. Conidia, 1/12. 819. Infected clover leaf. 820. Conidia, 1/12.

CERCOSPORA MICROSORA Sacc.—On the leaves of the linden (*Tilia Americana*) and other species of *Tilia*. Causes small, dark brown, sub-orbicular spots with light centers, which sometimes are very numerous and cover the greater part of the surface. Conidiophores fasciculate from a tubercular stroma, short, non-septate, olivaceous, almost hyaline at the tips 20-30 x 3 μ; conidia filiform, obclavate multi-septate, constricted at septa, olivaceous, 50-100 x 3.5 μ.

821. Infected leaf of *Tilia Europea*. 822. Conidiophores, 1/12. 823. Conidia, 1/12.

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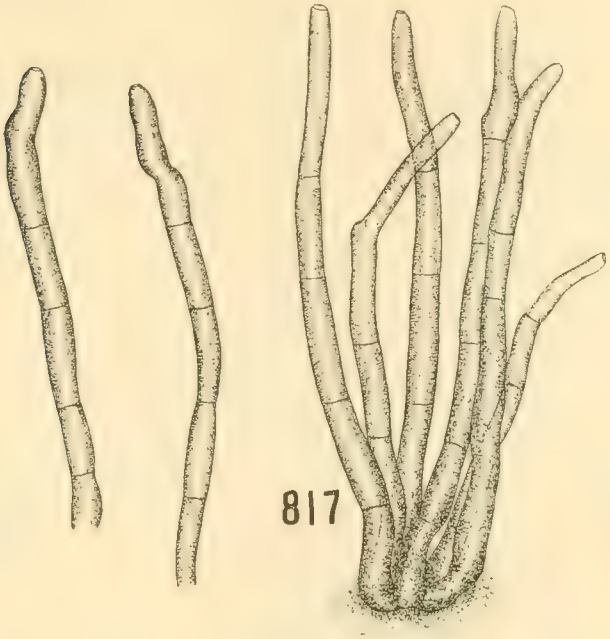
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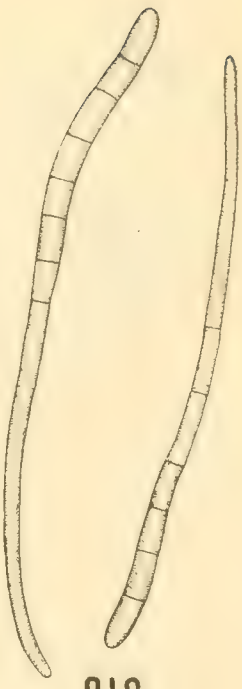
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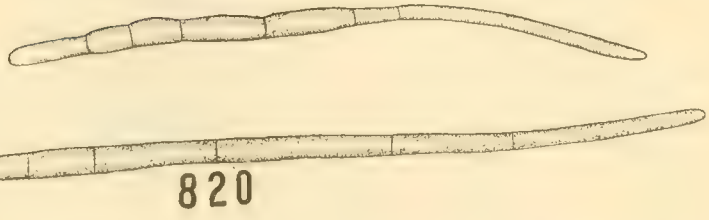
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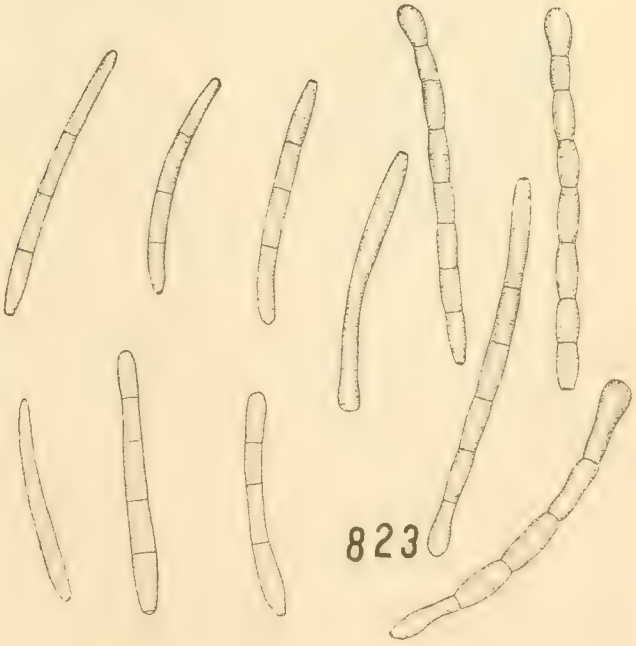
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CERCOSPORA OBESA E. & E.—On the leaves of the thistle. Causes irregular, grayish-brown, usually confluent leaf-spots, 2-5 mm. in diameter. Conidiophores short, closely fasciculate, wavy, brown, 1-septate; conidia long, tapering, smoky, 2-7 septate, 50-60 x 5-6 μ.

Note: the original description probably written from examination of immature material.

824. Conidiophores, 1/12. 825. Conidia, 1/12.

CERCOSPORA ROSICOLA Pass.—On the leaves of both wild and cultivated roses. Causes brown spots about 2-3 mm. in diameter surrounded by broad reddish border. Conidiophores in dense tufts, brown, somewhat wavy, tips irregular, 20-40 x 3-5 μ. Conidia cylindrical, straight or slightly curved, both ends pointed, smoke-colored, 1-4 septate, 30-50 x 3.5-5 μ.

826. Infected rose leaf. 827. Conidiophores, 1/12. 828. Conidia, 1/12.

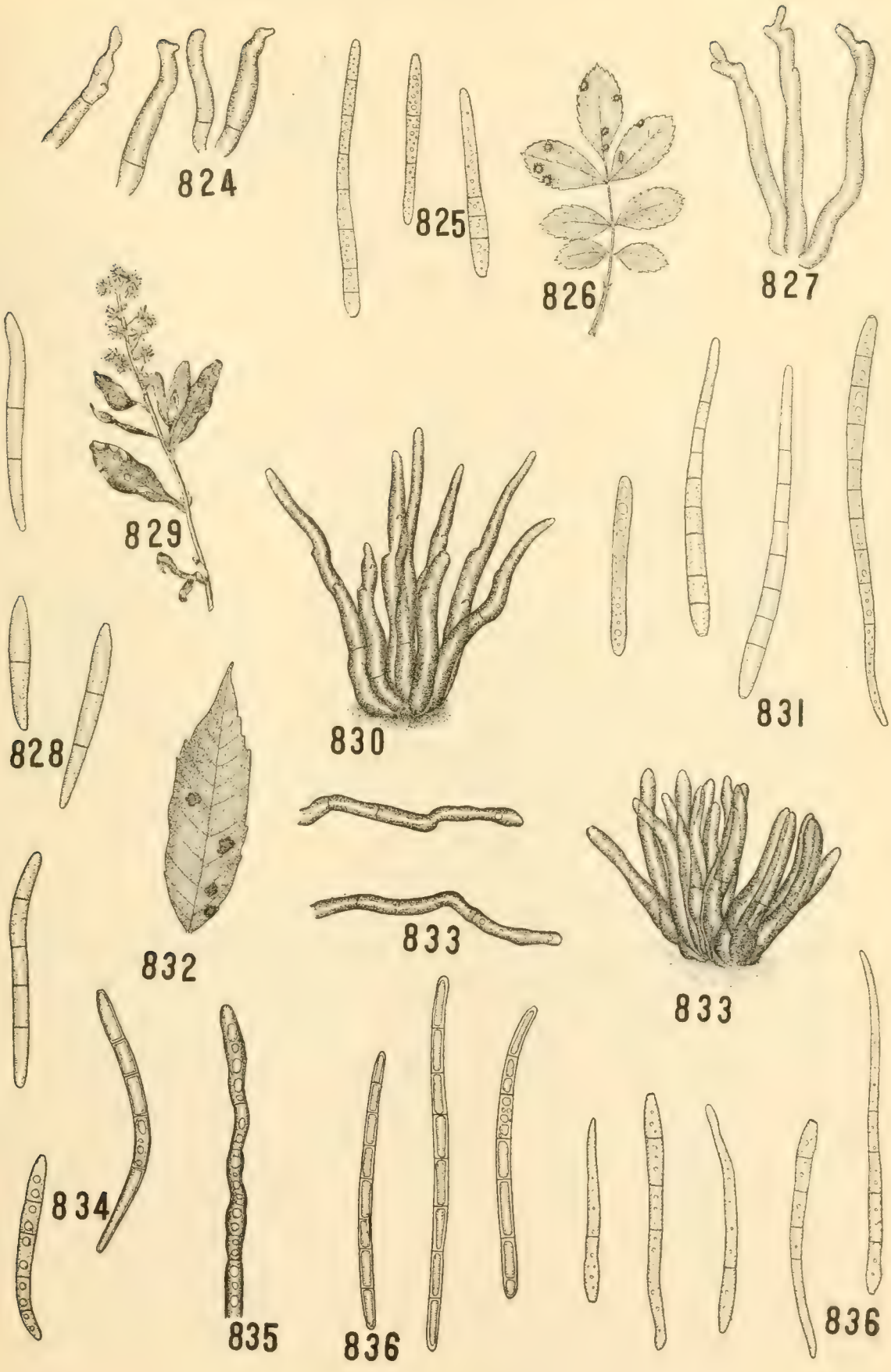
CERCOSPORA RESEDÆ Fcl.—On the leaves of mignonette. Causes small, yellowish gray, circular or irregular spots, frequently coalescing and causing a shrivelling. Conidiophores fasciculate, simple or slightly branched, few or non-septate, light brown becoming reddish-brown, 30-80 x 5 μ; conidia obclavate, 4-10 septate, 100-140 x 2.5-3 μ.

829. Infected plant of mignonette. 830. Conidiophores, 1/12. 831. Conidia, 1/12.

CERCOSPORA RHUINA C. & E.—On the leaves of the sumac (*Rhus copallina* and *R. glabra*). Causes irregular brown spots with dark, narrow, raised border. Conidiophores fasciculate, brown, usually 1-septate, 2-4 mm.; conidia long, tapering, brownish-tinged, 1-4 (occasionally more) septate, 40-70 x 3 μ.

Note: *C. rhoina* as given in Saccardo is probably a typographical error.

832. Infected leaflet of *Rhus glabra*. 833. Conidiophores, 1/12. 834. Conidia, 1/12. 835. Conidiophore from *R. copallina*, 1/12. 836. Conidia from same, 1/12.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CERCOSPORA RUBI Sacc.—On the leaves of *Rubus canadensis, R. fructicosa* and probably other species of the genus. Causes dry reddish-brown to ashy spots. Conidophores densely fasciculate, short, dark-brown, slightly branched, usually 1- or 2-septate, 40 x 4 μ; conidia attenuated at the top, curved, multi-septate, almost hyaline, 50-100 x 4.5 μ.

837. Infected leaf of *Rubus canadensis.* 838. Conidiophores, 1/12. 839. Conidium, 1/12. 840. Germinating conidium, 1/12.

CERCOSPORA SYMPLOCARPI Peck.—On the leaves of *Symplocarpus foetidus.* Causes definite suborbicular, brown spots 0.25—0.5 cm. broad, limited by a dark zone. Conidiophores on both surfaces of the leaf, short and dark-colored; conidia long, narrowed at tip, obclavate, pale, septate, 75-125 μ long.

841. Coniodiophores, 1/12. 842. Conidia, 1/12.

CERCOSPORA VIOLÆ Sacc.—On the leaves of violet. Causes circular, whitish, dry spots, visible on both surfaces. Conidiophores, simple or slightly branched, 30-35 x 4 μ; conidia, long, tapering, multi-septate, hyaline.

843. Infected leaf of violet. 844. Conidiophores, 1/12. 845. Conidia, 1/12.

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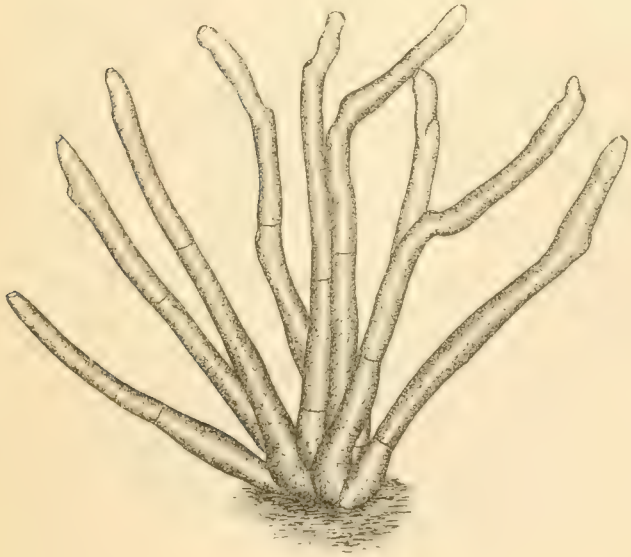

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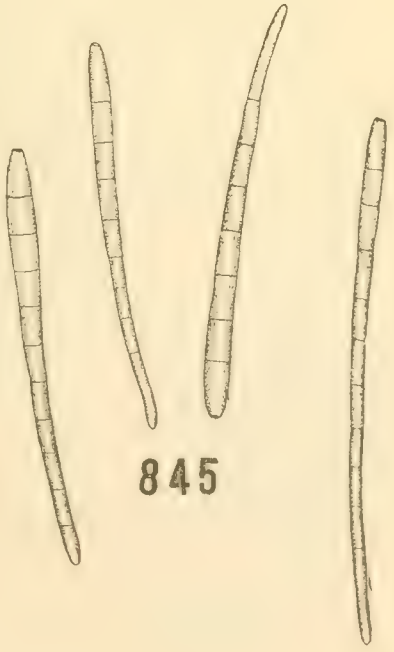

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ISARIOPSIS CLAVISPORA (B. & C.) Sacc.*—On the leaves of grape. Causes large irregular spots similar to mildew spots which become dry and ochre-colored. Conidiophores densely fasciculate, filiform, ochre-colored, septate, apex wavy, 50-200 x 4-5 μ; conidia elongate, obclavate, attenuate at apex, olivaceous to ochre-colored, 1-3 septate, 50-70 x 7-8 μ.

846. Part of infected grape leaf. 847. Conidiophores, 1/6. 848. Conidiophores and conidia, 1/12.

TUBERCULARIA VULGARIS Tode. (= *Nectria cinnabarina* Fries., page 34).

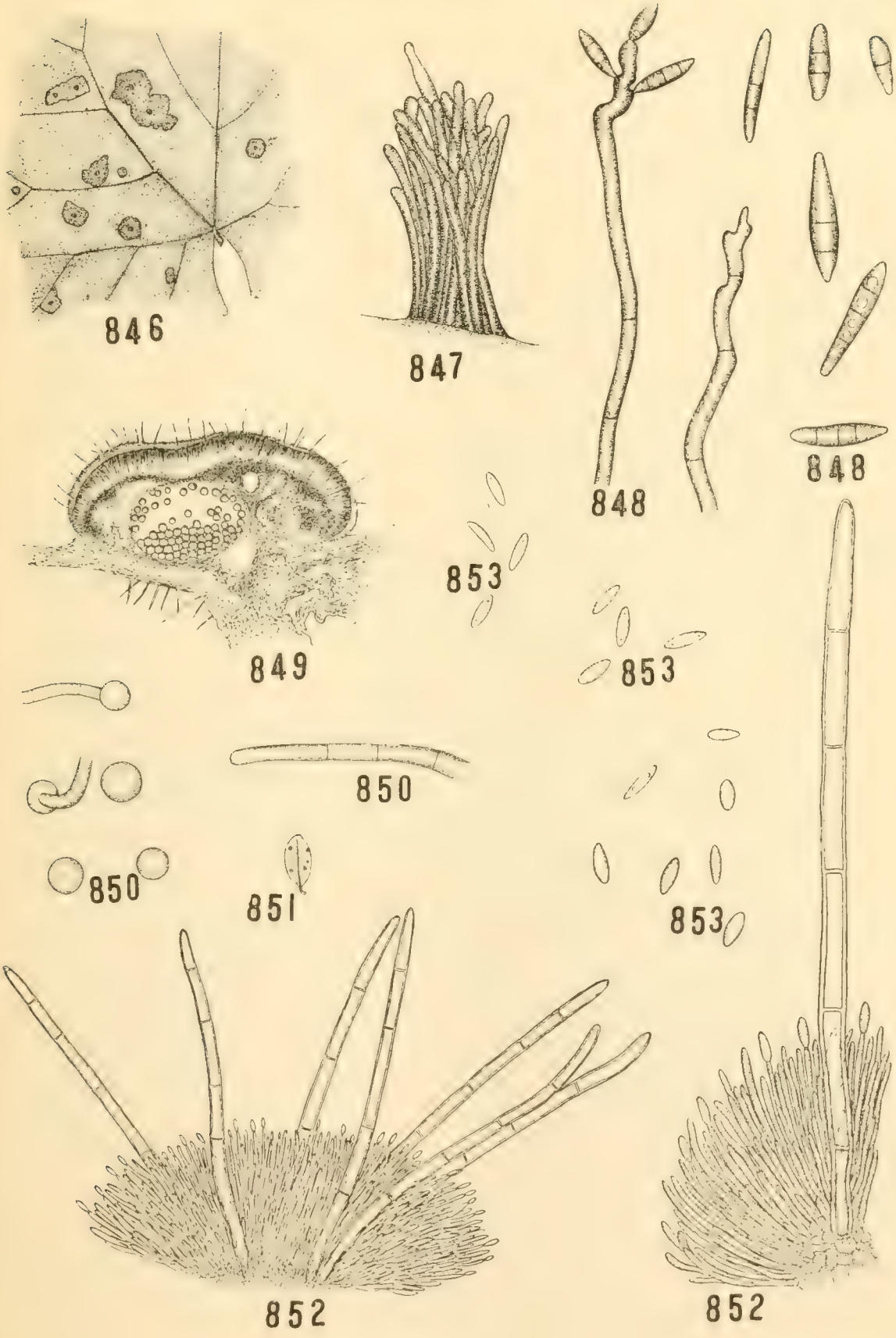
TUBERCULINA PERSICINA (Ditm.) Sacc.—On *Puccinia* sp. Sporodochium globose- depressed, often arranged in a circular manner, dark-violet color; conidia globose, 7-8 μ, rarely 10 μ in diameter, rose to violet-colored; sporophores simple or branched, septate, apex smooth or denticulate, hyaline.

849. Sporodochium growing on a rust, 2/3. 850. Conidiophore, tips of conidiophores with conidia, 1/12.

VOLUTELLA BUXI (Cda.) Berk.—On the twigs and elaves of *Buxus sempervirens*. Causes spots on the under side of the leaves, dying of parts and often of the entire plant. Sporodochia grouped, minute, sessile, cushion-shaped; setæ hyaline to faint rose-colored, obtuse, septate apices, erect, diverging and surrounding the sporodochium; sporophores fasciculate, acute at apex, hyaline, 15-20 x 2.5 μ. Conidia oblong, fusoid, hyaline to rose-colored, 10 x 3.5-4.5 μ.

851. Infected leaf of boxwood. 852. Sporodochia, conidiophores, conidia and bristles, 1/6 and 1/12. 853. Conidia, 1/12, from three different sources.

*Syn. *Cercospora viticola* (Ces.) Sacc.
Cereospora vitis (Lev.) Lind.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FUSARIUM LYCOPERSICI Sacc.—In the fibro-vascular tissues of the tomato. Causes a wilting of the plant. Mycelium hyaline and variously branched, conidiophore short and simple; conidia curved, both ends acute, 1-3 septate, hyaline becoming yellowish, 25-30 x 3.5-4 μ.

854. Cross-section of fibro-vascular bundles showing mycelium, 1/6. 855. Spores, 1/12. 856. Chlamydospores and mycelium, 1/12.

FUSARIUM RUBI Winter.—In buds and blossoms of dewberries and blackberries. Causes deformities of the buds and flowers commonly known as "false blossoms" or "double blossoms." The conidia are produced in the opening flower buds; they are variable in size and form, straight or curved, 1-8 septate, 14-30 x 3-3.5 μ.

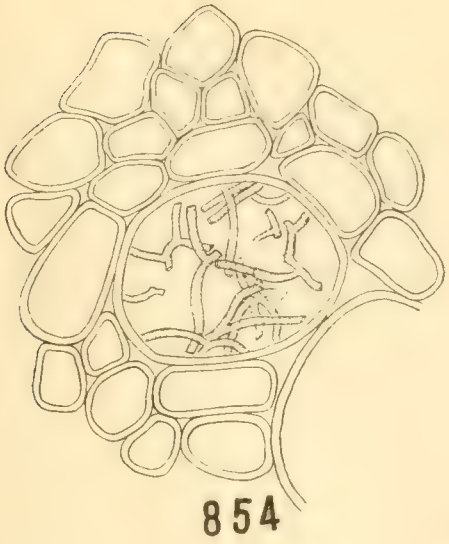
857. Spores, 1/12.

FUSARIUM sp. (= *Nectria ipomœa*, page 36).

SCLEROTIUM RHIZODES Auersw. — On *Calamagrostis canadensis* and other grasses. Causes leaves to become dry, rigid and bent into characteristic crooks. Felty growths of mycelium appear on the leaves and give rise to sclerotia. Sclerotia at first white and woolly. Described by Stout as follows:

"SCLEROTIUM RHIZODES.—Sclerotia on host plant are rounded and smooth on their entire surface except on the side which was appressed to the leaf and here the Sclerotium is usually flattened and rugose to conform to the ridges in the surface of the leaf."

858. *C. canadensis* infected with *Sclerotium rhizodes*, showing sclerotium and characteristic shepherd's crooks.



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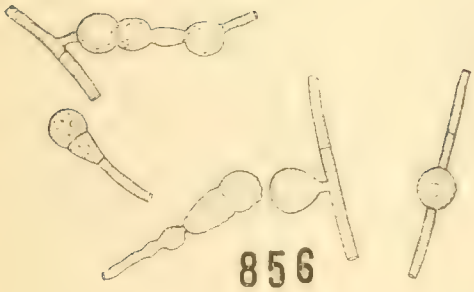

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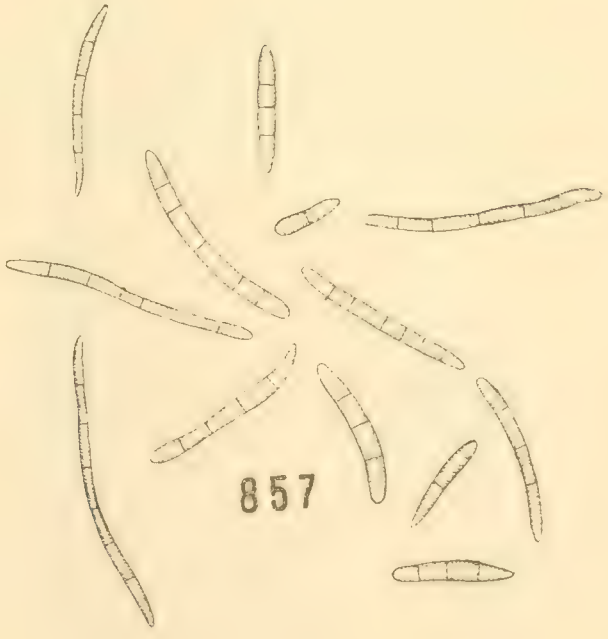

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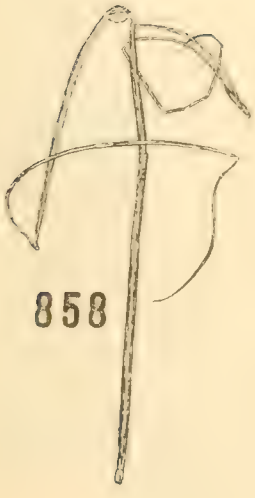

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SCLEROTIUM BATATICOLA Taub.—On the living roots of sweet potatoes. Causes the charcoal rot. Described by Taubenhaus as follows: "Sclerotia jet black, very minute; exterior smooth, made up of anastomosed black hyphæ; interior light to dark brown, made up of free thick-walled, cortical, hyphal cells; sclerotia vary much in shape, spherical, oval, oblong, elliptical, curved or even forked, varying in size from 25 x 22.4 μ to 152 x 32 μ, abundant throughout the interior root of the host.

Parasitic on living roots of sweet potato, *Ipomoea batatas*.

859. Mass of sclerotia, 2/3. 860. Single sclerotium attached to mycelium, 1/6. 861. Fusion of mycelia, 1/6. 862. Irregular cell formation in mycelia, 1/6. 863. Stages in formation of sclerotia, 1/6.

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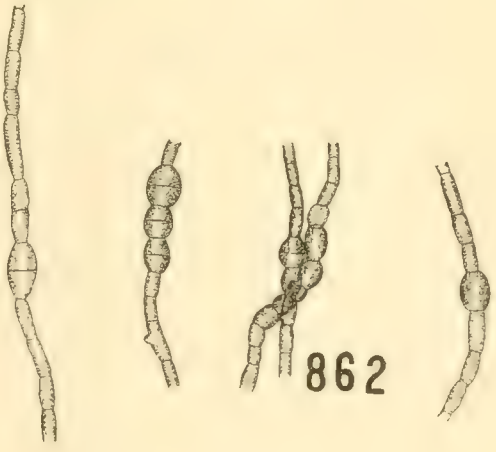

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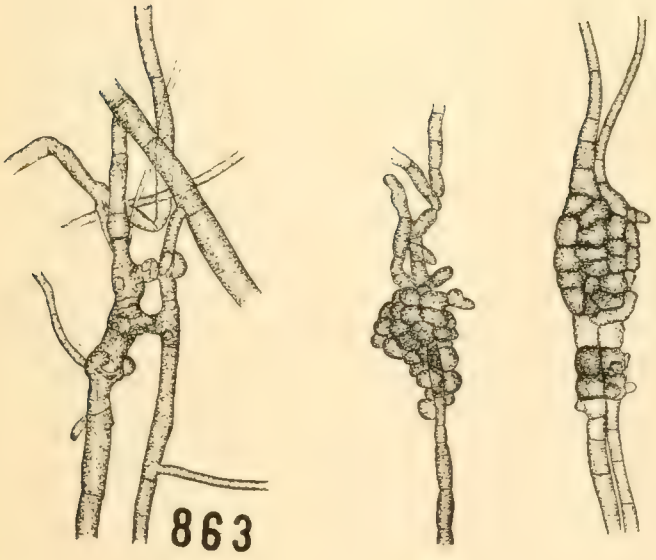

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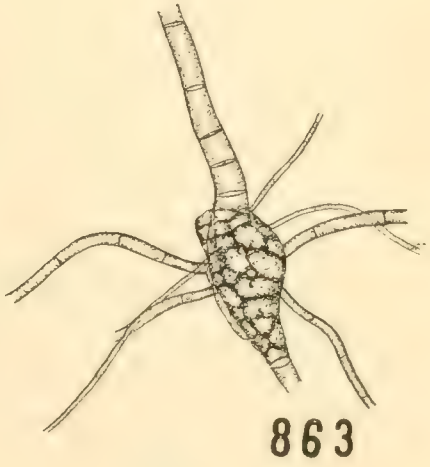

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RHIZOCTONIA SOLANI Kühn.—Very common on potatoes, tomatoes and carnations. Also reported on asparagus, alfalfa, horse-radish and many other plants. The cause of some very severe root and stem rots. Mycelium tufted, brown, closely septate, constricted at septa, frequently branching almost at right angles becoming yellow with age. Sclerotia variable in size, soft, white, becoming brown to black, composed of irregular and barrel-shaped cells. Sclerotia break into small masses whose cells function as chlamydospores.

864. Infected root of alfalfa. 865. Infected root or horse-radish. 866. Mycelium and cell formation from potato, 1/12. 867. Same from potato, 1/6. 868. Same from asparagus, 1/12.

USTILAGO ANOMALA J. Kunze.—On inflorescence of *Polygonum cilinode*. "Sori in ovaries or essential organs, the infected parts often remaining distinct, 2-3 mm. in length, protected by the perianth, forming a dusty purplish spore-mass, spores light violet, chiefly ovoid to spherical or occasionally somewhat irregular, with rather fine reticulations (chiefly 1-3 μ wide by 1 μ deep), 10-15 μ, rarely 17 μ in length." North American Flora, v. 7, p. 22 (1906).

869. Infected inflorescence of *P. cilinode*. 870. Spores, 1/12.

USTILAGO AVENÆ (Pers.) Jens.—On inflorescence of cultivated oats. "Sori in spikelets, forming a dusty olive-brown spore mass, about 6-12 mm. long by half as wide, usually rather completely destroying the floral parts, eventually becoming dissipated, rarely in leaves; spores lighter-colored on one side, subspherical though often more elongate, minutely echinulate, 5-9 μ in length." North American Flora, v. 7, p. 7 (1906).

871. Infected oat plant. 872. Spores, 1/12. 873. Basidiospore, 1/12. 874. Germinating spores, 1/12.

USTILAGO HEUFLERI Fcl.—On the leaves of *Erythronium americanum*. "Sori in leaves, forming conspicuous rounded or often elongate pustules, covered by a thin whitish membrane which upon rupture discloses a somewhat dusty black spore-mass; spores dark reddish-brown, ovoid or ovate to spherical, usually regular thick-walled, smooth but inner wall provided with more or less evident projections extending into outer lighter-colored part, 13-22 μ in length." North American Flora, v. 7, p. 20 (1906).

875. Infected leaf of *E. americanum*. 876. Spores, 1/12.

USTILAGO HORDEI (Pers.) K. & S.—On inflorescence of cultivated barley. "Sori in spikelets, forming an adhering purple-black spore-

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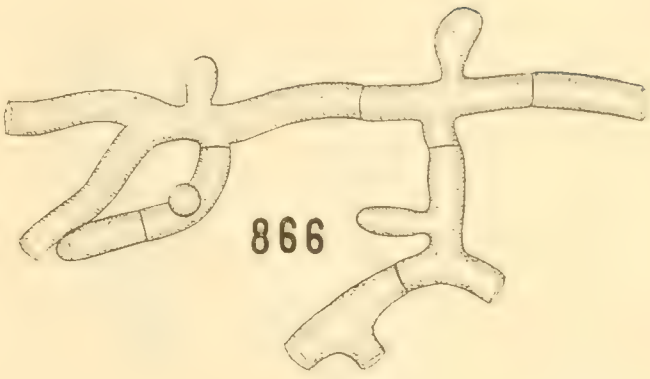
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mass, about 6-10 mm. in length, covered rather permanently by the transparent basal parts of the glumes; spores lighter-colored on one side, usually subspherical or spherical, smooth 5-9 μ, the most elongate rarely 9-11 μ, in length." North American Flora, v. 7, p. 6 (1906).

877. Infected head of barley. 878. Spores, 1/12.

USTILAGO LEVIS (K. & S.) Magn.—On inflorescence of cultivated oats. "Sori in spikelets forming a black-brown spore-mass, sometimes small and entirely concealed by the glumes but usually evident and destroying and inner basal parts; spores lighter-colored on one side, subspherical to spherical or rarely more elongate, smooth, 5-9 μ, the most elongate rarely 11 μ, in length." North American Flora, v. 7, p. 7 (1906).

879. Infected head of oats. 880. Spores, 1/12.

USTILAGO NEGLECTA Niessl.—On the foxtail grass. "Sori in spikelets infecting all of the spike, ovate, 2-3 mm. in length enclosed by glumes, soon rupturing and disclosing a dusty dark-brown spore-mass; spores dark brown, usually ovoid to spherical or sometimes more elongate, prominently and abundantly echinulate, chiefly 10-14 μ in length." North American Flora, v. 7, p. 16 (1906).

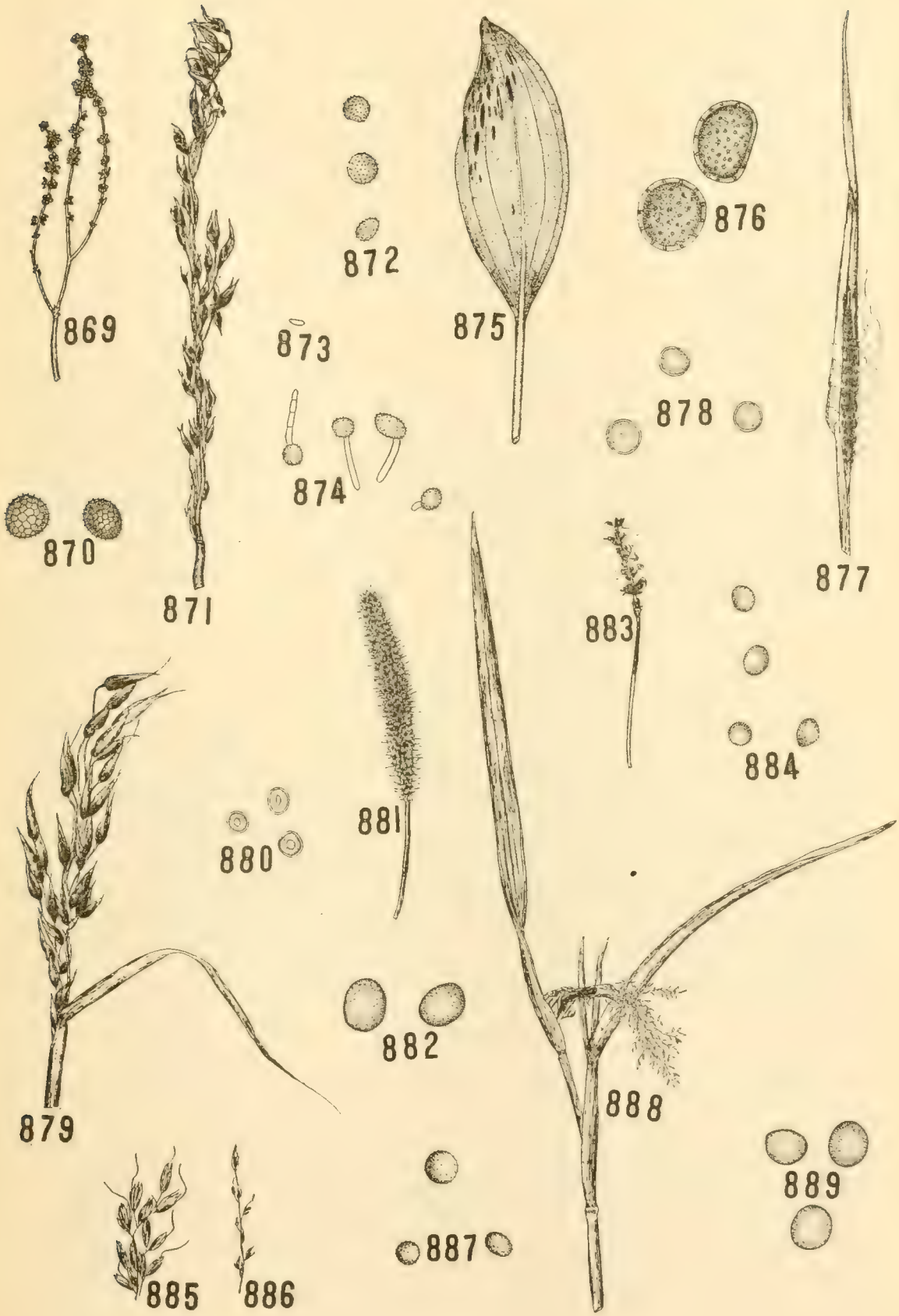
881. Infected head of foxtail grass. 882. Spores, 1/12.

USTILAGO NUDA (Jens.) K. & S.—On inflorescence of cultivated barley. "Sori in spikelets forming a dusty olive-brown spore-mass, about 6-10 mm. long by half as wide, temporarily protected by a thin membrane but soon becoming dissipated and leaving the naked rachis behind; spores lighter-colored on one side, minutely echinulate, subspherical to spherical or occasionally more elongate, 5-9 μ in length." North American Flora, v. 7, p. 8 (1906).

883. Infected head of barley. 884. Spores, 1/12.

USTILAGO PERENNANS Rostr. — On inflorescence and leaves of *Arrhenatherum elatius*. "Sori in spikelets, forming a black-brown adhering spore-mass, sometimes small and entirely concealed by the glumes but usually evident and destroying inner and basal parts: spores lighter-colored on one side, spores subspherical to spherical or rarely more elongate, smooth, 5-9 μ, the most elongate rarely 11 μ in length." North American Flora, v. 7, p. 7 (1906).

885. Healthy head of *A. elatius*. 886. Infected head. 887. Spores, 1/12.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USTILAGO PUSTULATA T. & E.—On the inflorescence of *Panicum proliferum.* "Sori usually in ovaries, sometimes also in stamens, forming ovate bodies about 2-4 mm. in length, occasionally in stems near nodes or at base of inflorescence and then forming more conspicuous often nodular swellings one to several centimeters in length, with dehiscence of the thin smooth membrane disclosing a dusty olive-brown spore-mass; spores chiefly ovoid to spherical, occasionally more irregular, usually prominently echinulate, 9-12 μ, the most elongate rarely 15 μ, in length." North American Flora, v. 7, p. 14 (1906).

888. Infected inflorescence of *P. proliferum.* 889. Spores, 1/12.

USTILAGO RABENHORSTIANA Kühn.—On the inflorescence of crab-grass. "Sori usually involving the entire inflorescence, linear-oblong, 3-5 cm. in length, at first hidden by the enveloping leaf-sheaths but finally more or less visible as a black-brown dusty mass of spores surrounding the elongate remnants of the inflorescence; spores reddish olive-brown, ovoid to spherical or occasionally somewhat angled, echinulate or verruculose, usually 10-14 μ in length." North American Flora, v. 7, p. 17 (1906).

890. Infected inflorescence of crab-grass. 891. Spores, 1/12.

USTILAGO STRIÆFORMIS (West.) Niessl.—On redtop grass. "Sori in leaves rarely in the inflorescence, from short linear often extending apparently by terminal fusion for several cm., also occasionally fusing laterally to cover most of the leaf, at first covered by epidermis but this soon ruptured and dusty brown-black lines of spores becoming scattered and leaves shredded, spores usually ellipsoidal to spherical, occasionally irregular, prominently echinulate, chiefly 9-14 μ in length." North American Flora, v. 7, p. 18 (1906).

892. Spores, 1/12.

USTILAGO TRITICI (Pers.) Rostr.—On inflorescence of wheat. "Sori in spikelets, forming a dusty olive-brown spore-mass, about 8-12 mm. long by half as wide, usually entirely destroying floral parts and eventually becoming dissipated and leaving behind only the naked rachis; spores lighter-colored on one side, usually subspherical, occasionally more elongate, minutely echinulate especially on the lighter side 5-9 μ in length." North American Flora, v. 7, p. 8 (1906).

893. Infected heads of wheat. 894. Spores, 1/12.

USTILAGO UTRICULOSA (Nees.) Tul. — On the inflorescence of *Polygonum pennsylvanicum.*

"Sori in ovaries and probably in stamens, protected by floral envelopes, ovate, about 3-4 mm. in length, forming a dusty purplish spore-mass; spores violet, chiefly subspherical or spherical, with prominent winged reticulations (2-4 μ wide by about 1.5 μ deep), chiefly 9-14 μ in diameter." North American Flora, v. 7, p. 22 (1906).

895. Infected inflorescence of *P. pennsylvanicum.* 896. Spores, 1/12.

USTILAGO ZEÆ (Beck.) Ung.—On ears, tassel, leaves and stems of corn. "Sori on any part of the host, usually prominent, forming irregular swellings from a few mm. to over a dm. in diameter, at first protected by a sort of false white membrane composed of plant cells and semi-gelatinized fungous threads, soon rupturing and disclosing a reddish-brown spore-mass; spores ellipsoidal to spherical or rarely more irregular, prominently tough rather bluntly echinulate, 8-11 μ, the most elongate 15 μ, in length." North American Flora, v. 7, p. 15 (1906).

897. Infected inflorescence of corn. 898. Spores, 1/12.

MELANOPSICHIUM AUSTRO-AMERICANUM (Speg.) G. Beck.—On stems, leaves and inflorescence of *Polygonum pennsylvanicum.* "Sori chiefly in the inflorescence, forming more or less irregular lobed masses arising from the fusion of the infected parts, less commonly on the leaves and then smaller, usually prominent, 2 or 3 mm. to 2 cm. in length, internally somewhat nodular or tubercular, forming a hard, firmly agglutinated, black, spore mass mixed with plant tissues, spores oblong to chiefly subspherical, often somewhat irregular, with more or less evident gelatinous envelope, usually rather prominently echinulate, chiefly 10-14 μ, the most elongate rarely 17 μ in length." North American Flora, v. 7, p. 30 (1906).

899. Infected inflorescence of *P. pennsylvanicum.* 900. Infected stem of same. 901. Spores, 1/12.

SOROSPORIUM ELLISII Wint.—On the inflorescence of *Andropogon virginicus.* "Sori elongate, including the entire inflorescence or more rarely confined to the individual spikelets, chiefly 1 cm. in length, often hidden by enveloping leaf-sheaths, provided with evident false membrane, within which is the black-brown dusty spore-mass; spore balls dark-reddish brown, subopaque, rather temporary, oblong to subspherical, chiefly 40-100 μ in length, spores somewhat irregular,

oblong to chiefly subspherical or polyhedral, thick-walled (wall often irregular thickened and lighter-colored where spores have been in contact), verruculose, chiefly 12-19 μ in length." North American Flora, v. 7, p. 39 (1906).

902. Infected inflorescence of *A. virginicus*. 903. Spore balls, 2/3. 904. Spores, 1/12.

SOROSPORIUM SYNTHERISMÆ (Peck.) Farl.—On the inflorescence of *Panicum proliferum*. "Sori involving the entire inflorescence elongate, 3-7 cm. in length, or rarely limited to individual spikelets and then shorter, protected by leaf sheaths, provided with false membrane that ruptures from the apex down disclosing black-brown spore mass and shredded filaments of plant tissue; sterile cells of membrane hyaline, oblong to circular or subspherical, with tendency to adhere in filaments when separated, spore balls rather evanescent, variable in shape and size, irregularly oblong to spherical, 40-100 μ in length, spores very minutely verruculose, inner often appearing smooth, subspherical or somewhat polyhedral to occasionally more elongate, chiefly 9-13 μ in length." North American Flora, v. 7, p. 38 (1906).

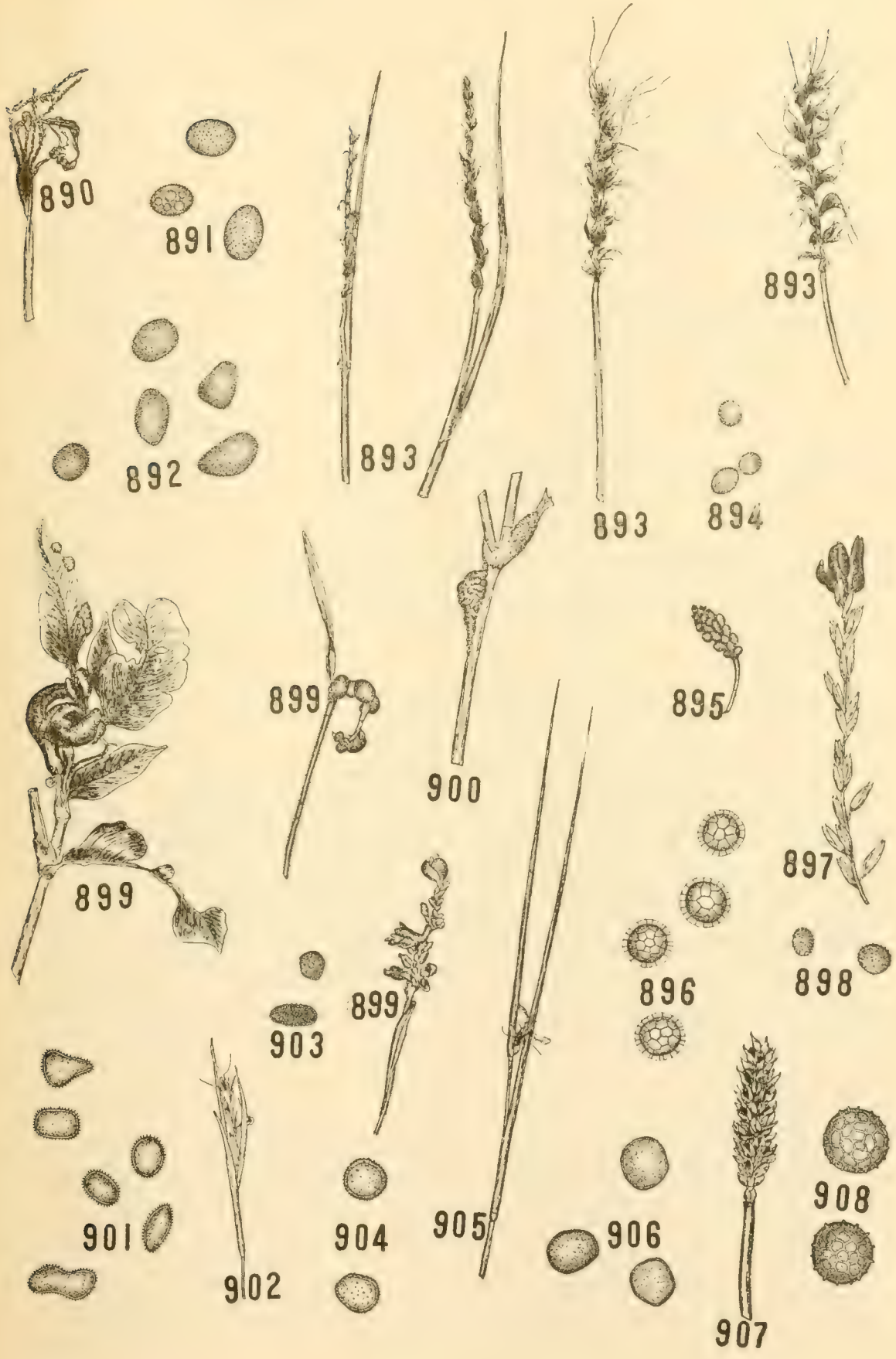
905. Infected inflorescence of *P. Proliferum*. 906. Spores, 1/12.

TILLETIA FŒTENS (B. & C.) Trel.—In the ovaries of wheat. "Sori in ovaries, ovate to oblong, 5-8 mm. in length more or less concealed by the glumes, all or only part of the ovaries of a spike infected; spores light to dark-brown, oblong to chiefly subspherical, occasionally somewhat angular, fœtid especially when young, smooth, chiefly 16-22 μ, the most elongate rarely 28 μ, in length." North American Flora, v. 7, p. 48 (1906).

907. Infected head of wheat. 908. Spores, 1/12.

TILLETIA TRITICI (Bjerk.) Wint.—In the ovaries of wheat. "Sori in ovaries, ovate to oblong, 5-8 mm. in length more or less concealed by the glumes, sterile cells few, hyaline, subspherical with medium thin wall, smaller than spores; spores chiefly subspherical or spherical, light to dark-brown, with winged reticulations about 1 μ high by 2-4 μ wide, 16-22 μ in diameter." North American Flora, v. 7, p. 48 (1906).

909. Spores, 1/12. 910. Larger spores from another specimen, 1/12.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CINTRACTIA JUNCI (Schw.) Trel.—On the inflorescence of *Juncus tenuis.*

"Sori usually linear, surrounding peduncles and pedicels for more or less of their length, sometimes in basal parts of the flowers and even occasionally filling the ovaries, forming an agglutinated black spore-mass; sterile cells usually not evident since inconspicuous and early evanescent; spores black-brown, subopaque more or less agglutinated, somewhat compressed laterally and so appearing oblong to irregularly polygonal or subcircular according to view, minutely pitted, 14-22 μ in length." North Amreican Flora, v. 7, p. 34 (1906).

911. Infected inflorescence of *Juncus tenius.* 912. Spores, 1/12.

ENTYLOMA AUSTRALE Speg.—On the leaves of *Physalis virginiana.* "Sori in leaves, forming thin at first light-yellow but later darker-colored roundish or angular areas, usually 0.5-6 mm. in length; spores light to reddish yellow, ovoid to spherical or slightly angled, usually with apparently thick wall, chiefly 10-16 μ in length, conidia forming withish epi- or hypophyllous growths, linear, somewhat curved, usually 30-55 x 1-2 μ." North American Flora, v. 7, p. 64 (1906).

913. Infected leaf of *Physalis virginiana.* 914. Spores, 1/12.

UROCYSTIS CEPULÆ Frost.—On bulbs of *Allium cepa.* "Sori in leaves forming isolated pustules or often affecting them for the greater part of their length and breadth, sometimes occurring at their base in the bulbs upon rupture of covering membrane disclosing a dusty black-brown spore-mass; spore-balls ovoid to spherical, small 17-25 μ in length, sterile cells tinted, ovoid to spherical, small rather completely covering the spores, usually 4-8 μ in length; spores reddish-brown, ovoid to spherical, usually 1, rarely 2 in a ball, chiefly 12-16 μ in length." North American Flora, v. 7, p. 57 (1906).

915. Spores, 1/12.

UROCYSTIS OCCULTA (Wallr.) Rob.—On cultivated rye. "Sori in leaves (especially on under side of sheaths), culm and inflorescence forming linear striæ usually of great length and often merged into a continuous stratum of dusty reddish-black spore-balls; spore-balls oblong to spherical, 16-32 μ in length; sterile cells often incompletely covering the spores, hyaline or yellowish-tinted, subspherical to oblong, usually with distended and uniformly thickened walls, spores

reddish-brown, oblong to subspherical, often with sides flattened, smooth, 1 or 2, rarely 3 or 4 in a ball, 11-18 μ in length." North American Flora, v. 7, p. 57 (1906).

916. Infected leaf of rye. 917. Infected inflorescence of rye. 918. Spores, 1/12.

COLEOSPORIUM CAMPANULÆ (Pers.) Lev. (= *Peridermium rostrupi*, E. Fischer, page 164).

"O. Pycnia amphigenous, scattered, numerous, originating between mesophyl and cortical layer, noticeable, large, 0.2-0.4 mm. wide, 1-2 mm. long, dehiscent by a longitudinal slit, 90-110 μ high.

"I. Aecia from a limited mycelium, amphigenous, scattered, 1-3 on discolored spots bullate, tongue-shaped, large, 1-3 mm. long, 0.7-1.5 mm. high, yellow fading to white; peridium rupturing irregularly, fragile, white, cells overlapping, outer and inner walls same thickness, about 4-6 μ, outer smooth, inner moderately verrucose; æciospores broadly ellipsoid or globoid, 17-22 by 22-31 μ; wall colorless, thin, 2-3.5 μ, densely verrucose, with prominent, elongate papillæ." On *Pinus rigida*.

"II. Uredinia hypophyllous, scattered often confluent, 0.5 mm. across, soon naked, orange-red fading to white, ruptured epidermis evident; urediniospores ellipsoid, 18-23 by 20-30 μ; wall thin, 1-1.5 μ, densely verrucose, with prominent, elongate papillæ.

"III. Telia hypophyllous, scattered often confluent, small, 0.2-0.5 mm. across, slightly elevated, blood-red fading to pale brownish-yellow; teliospores with wall swelling 15-25 μ thick above; contents, orange-red fading to nearly colorless, cylindrical or clavate-oblong, 17-24 by 55-85 μ, rounded or obtuse at each end." On *Campanula* sp. North American Flora, v. 7, p. 88 (1907).

919. Lower surface of infected leaf of *C. rapunculoides* showing sori. 920. Uredospores, 1/12.

COLEOSPORIUM IPOMOEÆ (Schw.) Burr.—On *Ipomœa hederacea*

"O. Pycnia and aecia unknown.

"II. Uredinia hypophyllous, widely scattered, or somewhat clustered, 0.25-1 mm. across, early naked, orange-yellow fading to white, ruptured epidermis usually inconspicuous; urediniospores, ellipsoid, 13-21 by 18-27 μ, more or less angular and irregular; wall thin, 1-1.5 μ, closely and noticeably verrucose.

"III. Telia hypophyllous, widely scattered, often confluent, pulvinate, 0.5 mm. or less across, deep, reddish-orange fading to pale yellow; teliospores with walls swelling 20-40 μ above; contents orange yellow fading to colorless, oblong, or slightly clavate, 19-23 by 60-80 μ, rounded or obtuse at both ends." North American Flora, v. 7, p. 87 (1907).

921. Uredospores from leaf of *I. hederacea*, 1/12.

PERIDERMIUM ACICOLUM U. & E. (= *Coleosporium solidaginis* Schw., page 162).

MELAMPSORA MEDUSÆ (Thüm.) Arthur.—On *Populus deltoides*. Described by Arthur as follows:

"O. Pycnia chiefly epiphyllous, scattered or somewhat gregarious, minute, punctiform, pale-yellow, inconspicuous, hemispherical, 40-80 μ in diameter, half as high.

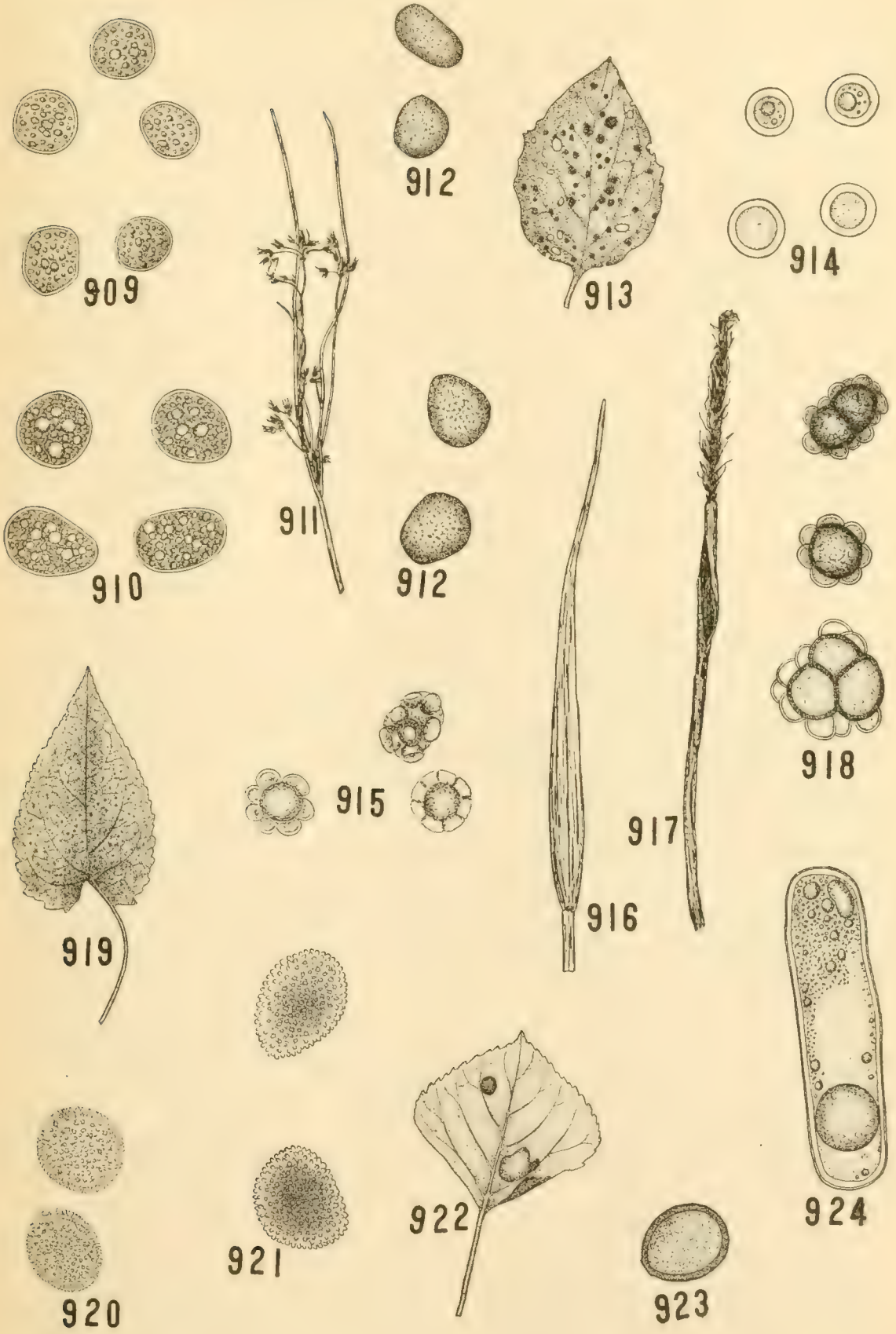
"I. Aecia chiefly hypophyllous, scattered or somewhat gregarious, small, 0.1-0.3 mm. broad, round or oblong, pale-yellow fading to white, inconspicuous, formed between epidermis and mesophyl, soon naked, pulverulent, ruptured epidermis noticeable; æciospores globoid, 17-22 x 24 μ; wall colorless, thick, 2.5-3 μ, minutely verrucose, with minute crowded papillæ, pores indistinct.

"II. Uredinia amphigenous, or only hypophyllous, scattered, roundish, small, 0.2-0.4 mm. across, early naked, somewhat pulverulent, orange-yellow, fading to pale brownish-yellow, ruptured epidermis usually inconspicuous; urediniospores ellipsoid or obovate-ellipsoid, 15-18 by 22-30 μ, usually flattened laterally; wall colorless, 2.5-3 μ, or up to 10 μ on the flattened sides, sparsely and evenly verrucose, with fine papillæ, except on the flattened sides which are smooth; paraphyses numerous, intermixed with the spores, capitate, smooth, 40-65 μ long, head 14-25 μ broad, wall thick, 3-6 μ, peripheral paraphyses thinner-walled and more clavate.

"III. Telia amphigenous or only hypophyllous, scattered, or somewhat confluent, irregularly roundish, small 0.2-0.4 mm. across, slightly elevated, light reddish-brown, becoming deep chocolate brown, subepidermal; teliospores prismatic, 12-15 by 30-45 μ; wall smooth, cinnamon-brown, uniformly thin, 1 μ."

Note: In North American Flora, v. 7, p. 98 (1907), as *Uredo medusæ*.

922. Under side of infected leaf of *P. deltoides*. 923. Uredospore, 1/12. 924. Teleutospore, 1/12.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COLEOSPORIUM SOLIDAGINIS (Schw.) Thüm. (= *Peridermium acicolum* Underw. & Earle).

"O. Pycnia amphigenous, scattered, numerous, originating between mesophyl and cortical layer, noticeable, 0.3-0.5 mm. wide by 0.5-0.8 mm. long, dehiscent by a longitudinal slit, low-conoidal, 8-100 μ high.

"I. Aecia from a limited mycelium, amphigenous, numerous scattered on discolored spots occupying a part of a leaf, erumpent from longitudinal slits, tongue-shaped, 0.5-1 mm. long, by 0.50.7 mm. high; peridium rupturing irregularly, moderately firm, white, cells over-lapping, 35-45 μ long, not much narrower, walls transversely striate, inner coarsely verrucose, thick, 5-6 μ, outer less rough and somewhat thinner æciospores ellipsoid, 20-25 by 28-40 μ; wall colorless, closely and coarsely verrucose with deciduous tubercles which are directed away from a smooth spot extending up one side, thick, 2-3 μ on the smooth spot, increasing to 5-6 μ on the opposite side, including the tubercles.

"II. Uredinia hypophyllous, rarely also epiphyllous, irregularly scattered, or at first somewhat gregarious and crowded, 0.3-0.5 mm. across, soon naked, yellow or orange-yellow, ruptured epidermis inconspicuous; urediniospores ellipsoid or globoid, 17-22 by 20-30 μ; wall rather thin, 1-2 μ, closely and strongly verrucose; contents orange-yellow when fresh, fading to colorless." (On *Pinus rigida.*)

"III. Telia hypophyllous, scattered irregularly or sometimes crowded and confluent, slightly elevated, 0.3-0.5 mm., across, reddish-orange; teliospores with wall swelling 30-40 μ thick above; contents orange-yellow fading to colorless, terete, 15-23 by 55-80 μ, rounded or obtuse at both ends; basidiospores globoid or elliptical, about 12 by 18 μ, orange-yellow." (On *Solidago* sp.) North American Flora, v. 7, p. 90.

925. Infected pine needles showing æcia. 926. Cross-section of pine needle showing æcia, 2/3. 927. Peridial cells, 1/12. 928. Aeciospores, 1/12. 929. Uredospores from leaf of cultivated aster, 1/12.

CRONARTIUM COMPTONIÆ Arthur (= *Peridermium pyriforme* Peck.).

"O. Pycnia unknown.

"I. Aecia appearing on the branches or often on the trunks, with no or only slight fusiform enlargements, scattered and usually distinct, oval or irregular in outline, sometimes elongate 1-3 by 1-6 mm. or large by becoming confluent, peridium not much exserted above

the roughened bark, rupturing along the sides and falling away; æciospores pyriform, oblong-pyriform, or obovate, 19-24 x 32-66 μ, usually acuminate below; wall 2-3 μ thick, rather finely and closely verrucose with low papillæ, contents orange-yellow when fresh." Mycologia, v. 6, p. 126-129 (1914). On *Pinus rigida.*

"II. Uredinia hypophyllous, scattered or somewhat gregarious, round, very small, about 0.1 mm. across, dehiscent by a central rupture, soon wide open and naked, pulverulent; peridium rather firm, cells polygonal, at the sides with walls uniformaly thin about 1 μ at the top with the inner walls greatly thickened, up to 10 μ; urediniospores oval or obovate, 16-21 by 23-31 μ; wall colorless, rather thick, 2.5, sparsely and finely echinulate.

"III. Telial columns hypophyllous, filiform, 40-100 μ thick, 0.5-2 mm. long; teliospores fusiform-oblong, 13-17 by 28-56 μ, obtuse at both ends; walls nearly colorless, smooth, thin, 1-1.5 μ. (On *Comptonia* sp.). North American Flora, v. 7, p. 121 (1907).

930. Peridial cells, 1/12. 931. Aeciospores, 1/12. 932. Uredospores, 1/12. 933. Teleutospore, 1/12.

CRONARTIUM RIBICOLA Fisch. (= *Peridermium strobi* Kleb.).

"O. Pycnia caulicolous, scattered, honey-yellow, forming minute bladdery swellings, exuding a sweet fluid.

Aecia caulicolous, forming globose galls; peridium inflated, rupturing at sides, thick, membranous, cells isodiametric, smooth or nearly so on outer surface, verrucose on inner surface except an elongate smooth spot, 2-2.5 μ thick, on the smooth side 3-3.5 μ thick. (On *Pinus strobus.*)

"II. Uredinia hypophyllous, thickly scattered in orbicular groups 1-5 mm. across, round pustular, small, 0.1-0.3 mm. across, dehiscent by a central opening, at first bright yellow; peridia delicate, inner walls thicker than the outer walls; urediniospores ellipsoid or obovate, 14-22 by 19-35 μ; wall colorless, medium thick, 2-3 μ, sparsely and sharply echinulate."

"III. Telia columns hypophyllous, cylindrical, 125-150 μ thick, up to 2 mm. long, curved, light orange-yellow becoming brownish; teliospores oblong or cylindrical, 8-12 by 30-60 μ rounded or obtuse at both ends; wall nearly colorless, smooth, rather thick, 2-3 μ. (On *Ribes* sp.) North American Flora, v. 7, p. 122 (1907).

934. Uredospores, 1/12. 935. Teleutospores, 1/12. 936. Portion of leaf of currant showing three uredo sori and four teleutosporic columns, 2/3.

PERIDERMIUM ROSTRUPI E. Fischer (= *Coleosporium campanulæ* (Pers.) Lev. (See page 159.)

POLYTHELIS THALICTRI (Chev.) Arthur. —On *Thalictrum* sp.

"O. Pycnia hypophyllous, few, sparingly scattered, among the telia, papillose, chestnut-brown, subcuticular, depressed-hemispherical, 110-130 μ broad.

"III. Telia hypophyllous, evenly scattered, over large areas, never confluent, round 0.2-0.6 mm. across, dehiscent by a pore, early naked, pulverulent, dark, chestnut-brown, ruptured epidermis evident; teliospores ellipsoid or oblong-ovate, 17-26 by 26-52 μ, greatly constricted at septum, the two cells easily separating, upper cell globoid, or rarely elliptical, the lower globoid, obvate or broadly cuneate, 16-26 by 18-26 μ; wall dark chestnut-brown, uniformly thick, 2 μ, coarsely and evenly verrucose; pedicel delicate, colorless, as long as the spore, wholly or partially deciduous. Mesospores usually plentiful." North American Flora, v. 7, p. 153 (1907).

937. Lower surface of infected leaf of *Thalictrum* sp. showing teleuto sori. 938. Teleutospores, 1/12.

PHRAGMIDIUM AMERICANUM Dietel.—On *Rosa* sp.

"O. Pycnia chiefly epiphyllous, usually few, gregarious and often confluent, inconspicuous, subcuticular and extending downward between the cells, pale honey-yellow, low-conoidal or discoidal, 80-125 μ broad by 30-40 μ high.

"I. Aecia chiefly hypophyllous or petiolicolous, usually compound or confluent, forming sori of irregular outline, 1-5 mm. across, applanate bright orange-yellow fading to pale yellow ruptured epidermis usually noticeable; paraphyses rather numerous but inconspicuous, surrounding each individual sorus, erect; not exceeding the height of the spore mass, clavate, 10-20 by 38-50 μ, the wall evenly thin, 1 μ, nearly or quite colorless, smooth; æciospores broadly ellipsoid or globoid, small, 18-20 by 20-26 μ; wall pale-yellow, rather thin, 1-1.5 μ, finely and closely verrucose with well-separated papillæ.

"II. Uredinia hypophyllous, numerous, thickly scattered, round, small, 0.1 mm. or less across, early naked, ruptured epidermis inconspicuous; paraphyses encircling the sorus, abundant and conspicuous, strongly incurved, cylindrical or somewhat clavate, 9-13 by 30-55 μ, the wall evenly thin, 1 μ or less, nearly or quite colorless, smooth; urediniospores obovate-globoid, small, 15-18 by 18-20 μ; wall pale yellow, thin, 1 μ, rather closely verrucose-echinulate, the pores indistinct, small, scattered, 8 μ or more."

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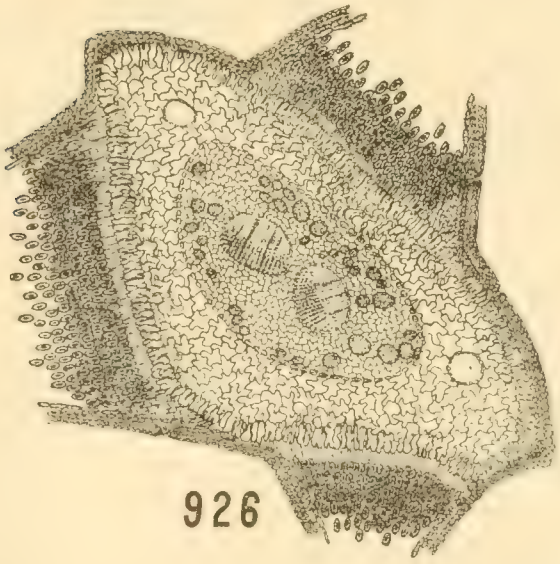
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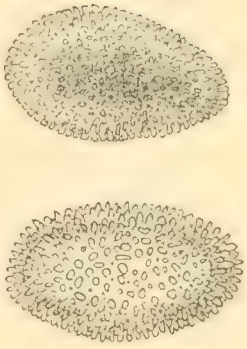
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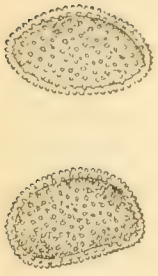
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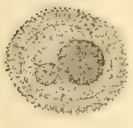

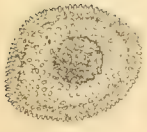

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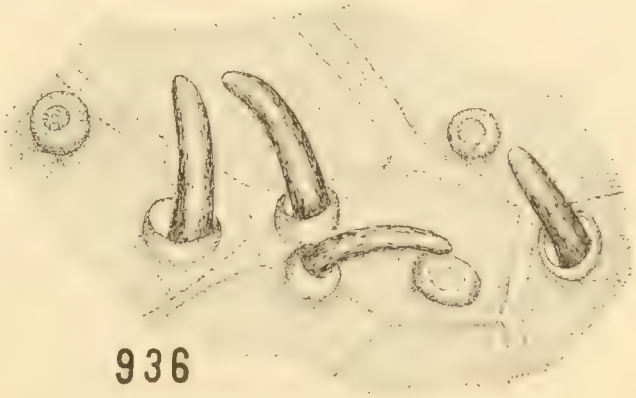
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"III. Telia hypophyllous, at first arising from the uredinia, numerous, thickly scattered, small, 0.1 mm. or less across, few spores in each sorus, ruptured epidermis inconspicuous; paraphyses none; teliospores cylindrical, 23-26 by 64-100 μ, slightly or not narrowed above or below, 8-11 (mostly 10) celled; wall blackish-brown, 3-7 μ thick, closely and rather coarsely verrucose, the apex usually with a conical hyaline papilla 10-12 μ long; pedicel rugose when dry, one and a half length of spore, the upper half colorless, except near the spore, 7 μ in diameter, the lower part colorless, usually terete, swelling in water, 16-20 μ in diameter. North American Flora, v. 7, p. 167 (1912).

939. Teleutospore, 1/12.

PHRAGMIDIUM OBTUSA (Strass.) Arthur.—On *Potentilla canadensis*. Described by Arthur as follows:

"O. Pycnia epiphyllous, in small crowded groups 0.1-.4 mm. across, on slightly larger reddened and somewhat hypertrophied spots, inconspicuous, in section globoid-lenticular 112-160 μ broad by 35-50 μ high.

"II. Uredinia at first epiphyllous, surrounding the pycnia, in crowded groups 0.5-1.3 mm. across, roundish or irregular, often confluent into rings, at first bullate, soon naked, somewhat waxy; uredinia afterward hypophyllous, scattered irregularly, round, 0.2-0.5 mm. across, early naked, slightly pulvinate, pulverulent, orange-yellow, fading to dirty-white, ruptured epidermis noticeable; paraphyses usually wanting; uredinospores obovate or ellipsoid, 15-18 by 19-26 μ; wall pale-yellow, nearly colorless, thin, 1-1.5 μ, finely verrucose-echinulate, points, 1-2 μ apart, the pores small, inconspicuous, 3 or 4, equatorial.

III. Telia hypophyllous, scattered, round, 0.2-0.5 mm. across, early naked, pulvinate, velvety, cinnamon-brown, ruptured epidermis inconspicuous; teliospores cylindrical-clavate, or clavate-lanceolate, 20-27 by 48-90 μ, rounded or obtuse above, obtuse or narrowed below, slightly or not constricted at the septa, 3-5 celled; wall cinnamon-brown, paler below, thin, 1-2 μ, thicker at apex, 5-8 μ; smooth; pedicel colorless, or tinted next to the spore, terete, 7-10 μ in diameter, firm, with thick wall, one half to once length of spore."

Note. In North Amercan Flora as *Kuehneola obtusa*, v. 7, p. 185 (1912).

940. Uredospores, 1/12. 941. Teleutospores, 1/12.

EARLEA SPECIOSA (Fries) Arth.—On leaves of cultivated roses.

"O. Pycnia chiefly epiphyllous and caulicolous, crowded in considerable groups, often confluent, inconspicuous, subcuticular, extending well into the lateral walls of the epidermal cells, pale honey-yellow, flattened-conoidal or discoidal, 65-160 μ in diameter by 35-50 mm. high.

"I. Aecia hypophyllous and caulicolous, usually on swollen and distorted areas of more or less extent, roundish, 0.5-1 mm. across, on leaves forming small groups, on petioles, stems and fruit confluent into irregular groups 10 mm. or more long, applanate, bright orange fading into pale yellow, ruptured epidermis usually conspicuous; paraphyses at first often rudimentary or wanting, in senile sori. peripheral, usually few, erect, finally somewhat exceeding the height of the spore mass, slender, clavate or cylindrical, 9-13 by 42-50 μ, the wall almost evenly thin 1 μ or less, colorless; æciospores oblong-elliptical, obovate, rarely oblong-clavate, 16-24 x 24-35 μ; wall pale-yellow, rather thin, 1-2 μ, distinctly echinulate-verrucose with pointed beads standing 1 μ apart, the pores indistinct, scattered.

"III. Telia caulicolous, gregarious, crowded, oblong, about 1 mm. long, usually more or less confluent and 10-30 mm. long causing a somewhat fusiform hypertrophy, at first crust-like, with age becoming felty, grayish-black; teliospores cylindrical, 21-27 by 58-102 μ, rounded at both ends, except a semi-hyaline apiculus above 3-7 μ, long and nearly as broad, 4-8 celled; walls smoky-brown, 3-5 μ thick, smooth, the pores 2 or sometimes 3 in each cell; pedicel three to five times length of spore, slightly tinted especially near the spore, 7-9 μ in diameter, usually tapering in lower part, nearly or quite solid due to thickened walls, somewhat rugose near base." North American Flora, v. 7, p. 175 (1912).

942. Teleutospore from cultivated rose, 1/12.

KUEHNEOLA UREDINIS (Link) Arthur.—On species of *Rubus* sp.

"O. Pycnia epiphyllous, in small crowded groups 0.3-0.5 mm. across, on somewhat larger reddened spots, pustular, prominent, flattened-hemispherical, or irregularly lenticular, large, 150-200 μ in diameter, nearly half as high.

"II. Uredinia at first epiphyllous, surrounding the pycnia, in crowded groups 0.5-1.3 mm. across, irregular in outline, 0.1-0.3 mm. across, in shortest diameter, usually somewhat elongate and often confluent into rings, at first bullate, soon naked and applanate, pulverulent, orange-colored fading to whitish, ruptured epidermis noticeable; uredinia afterward hypophyllous, scattered irregularly,

round, small, about 0.1 mm. across, early naked, pulverulent, pale lemon-yellow becoming nearly colorless, ruptured epidermis inconspicuous; paraphyses wanting; urediniospores of primary form irregularly ellipsoid or elliptical obovate, 16-20 by 20-27 μ, of secondary form more regularly-obovate, or globose-obovate, and slightly smaller, 15-19 by 17-25 μ; wall nearly or quite colorless, moderately thin, about 1.5 μ, noticeably and rather closely verrucose-echinulate, points about 1 μ apart, lower and broader in the primary than in the secondary form, the pores small, very indistinct, probably 3 or 4 and equatorial.

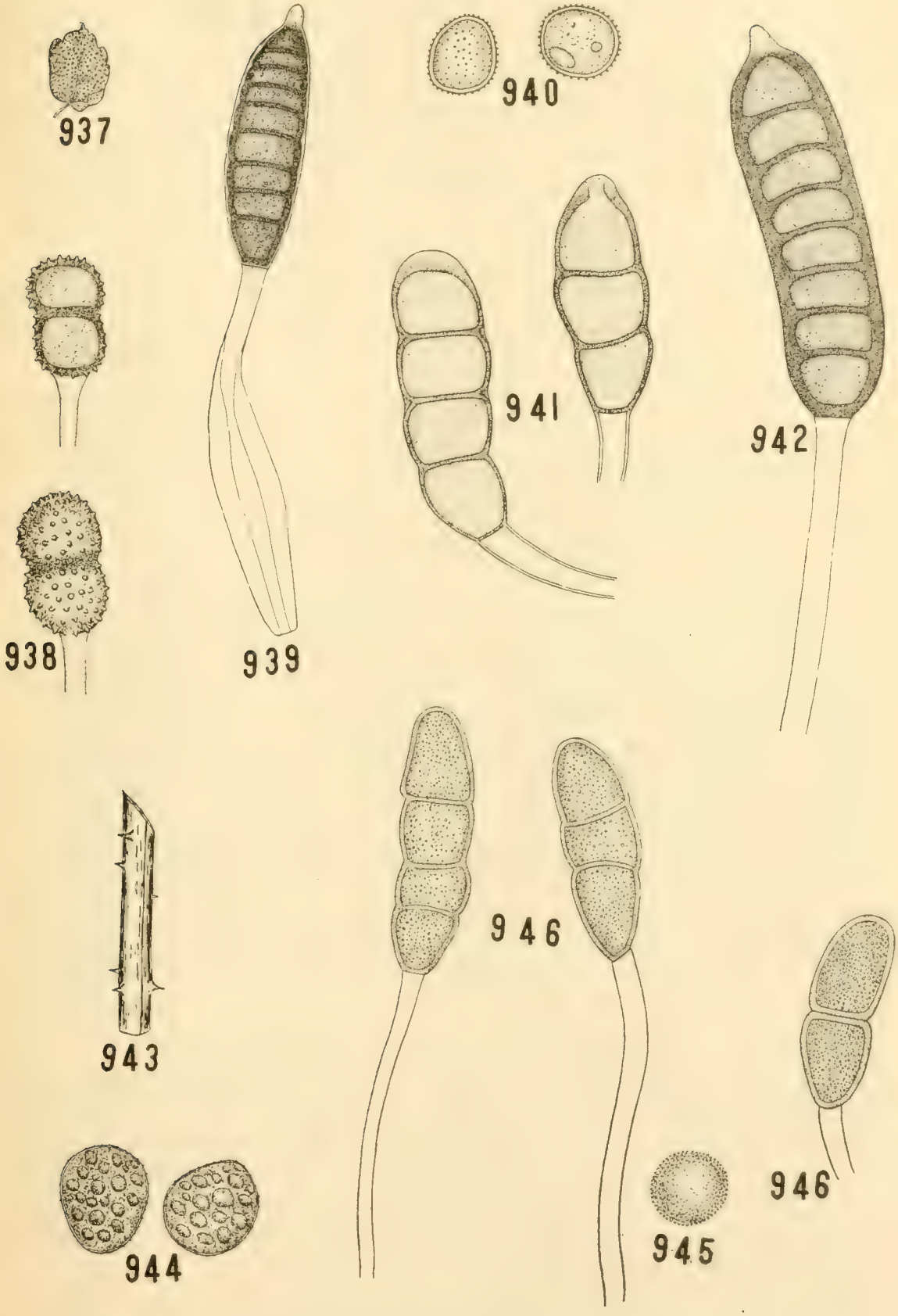
"III. Telia hypophyllous, irregularly scattered, irregularly roundish, 0.1-0.5 mm. across, early naked, pulvinate, velvety, yellowish or pure white, ruptured epidermis inconspicuous; teliospores cylindrical or cylindrical-clavate, 18-24 by 85-110 μ, irregularly flattened or coronate above, narrowed below, 5-13 celled usually 5-6 celled, each cell 15-24 by 17-40 μ, mostly 20-25 μ, trapezoidal and articulated to the cell above by a projection at one side containing the pore; wall nearly or quite colorless, thin, 1.5-2 μ, the apical cell thicker above, 3-5 μ, the other cells thickened above uniformly or only at the lateral projections, smooth or slightly roughened at apex; pedicel colorless, terete, very short, often seemingly wanting." North American Flora, v. 7, p. 186 (1912).

943. Infected cane of blackberry. 944. Uredospores 1/12.

GYMNOSPORANGIUM BOTRYAPITES (Schw.) Kern.—On *Chamæcyparis thyoides.*

"O. Pycnia epiphyllous, few gregarious, in small groups, 0.7-1.5 mm. across, punctiform, honey-yellow becoming blackish, conical, 128-190 μ in diameter by 64-112 μ high; ostiolar filaments, 30-65 μ long.

"I. Aecia hypophyllous, few, usually aggregated in groups of 2-8, rarely solitary, borne in gall-like, pyriform protuberances 1-1.5 mm. in diameter by 64-112 μ high by 1.5-3 mm, cylindrical, 0.3-0.8 mm. in diameter by 2-4 mm. high; peridium soon becoming finely cancellate, not dehiscent at apex; peridial cells cylindrical, long and narrow, hypha-like, 9-14 μ in diameter by 145-190 μ long, often irregularly bent, the outer, inner, and side walls of equal thickness, about 1.5-2 μ, whole surface smooth; æciospores globoid, small, 15-17 by 16-22 μ; wall dark cinnamon-brown, 2.5-3 μ thick, moderately verrucose, the pores obscure, numerous, scattered." North American Flora, v. 7, p. 195 (1912). On *Amelanchier canadensis.*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"Telia caulicolous, appearing on fusiform swellings, scattered, oval or irregular, about 1.5-3 mm. wide, by 2-7 mm. long, often confluent, hemispheric, chestnut brown; teliospores 2-4 celled, 13-19 x 35-77 μ, usually rounded above, somewhat narrowed below, slightly constricted at the septa, wall pale yellow, 1-1.5 μ, the pores 2 in each cell, near the speta." Kern in Bul. N. Y. Bot. Garden, v. 7, p. 452.

945. Aeciospores from Amelanchier sp., 1/12. 946. Teleutospores from Chamæcyparis thyoides, 1/12.

GYMNOSPORANGIUM EFFUSUM Kern.—On *Juniperus virginiana.* "O. Æcia unknown.

"III. Telia caulicolous, from a perennial mycelium, usually appearing on branches 0.3-1.5 cm. in diameter, causing long slender fusiform enlargements 0.5-2.5 x 15-40 cm., extending into and causing some swelling of the smaller branches and twigs arising from the infected areas, sometimes on the larger trunks, usually breaking forth in series along the branch with the grain of the wood, unevenly disposed, hypertrophied scars of previous seasons frequently interspersed, when dry more or less wedge-shaped, but often irregular and lacunose, sometimes forked or divided and staghorn-like, when mature and expanded 2-3 mm. broad by 2-5 mm. long at base, 7-10 mm. high, the surface more or less rugose, dark chestnut-brown becoming cinnamon-brown after expansion; teliospores 2-celled, oblong-ellipsoid, 16-22 by 45-55 μ, rounded or slightly narrowed both above and below, slightly constricted at the septum; wall dark cinnamon brown, rather thin, 1-2 μ, varying in thickness on different spores, the pores 1 or 2 in each cell, near the septum; pedicel hyaline, cylindrical, uniform, 3-5 μ in diameter, very long." North American Flora, v. 7, p. 201 (1912).

947. Teleutospores from *Juniperus virginiana,* 1/12.

GYMNOSPORANGIUM ELLISII (Berk|) Farlow.—On *Chamæcyparis thyoides.* This has been described by Fromme as follows:

"O. Pycnia epiphyllous, gregarious, in crowded circular groups, 2-5 mm. in diameter, on blackened areas, subepidermal, orange-yellow, globose in vertical section, 140-190 μ broad by 175 μ deep; ostiolar filaments 30-80 μ long.

"I. Aecia hypophyllous, fructicolous and caulicolous, in crowded groups, on discolored hypertrophied areas, cupulate, 0.2-0.3 mm. in diameter; peridium yellowish, fragile, becoming lacerate to the base,

slightly recurved, peridial cells oblong, 26-29 by 32-39 μ, overlapping, the outer wall thick, 7-10 μ, smooth, transversely striate, the inner wall much thinner, 2-3 μ, closely and prominently verrucose; æciospores globoid to oblong, 24-30 by 27-34 μ, the wall pale-yellow or colorless, 2-3 μ thick, closely and strongly verrucose, the pores 6-8, scattered." Mycologia, v. 6, p. 229 (1914). On *Myrica* sp.

"Telia caulicolous, from a perennial mycelium which distorts the younger branches causing slight enlargements and usually dense fasciations, numerous, thickly scattered, often over considerable areas, cylindric, filiform, 3-6 mm. long, about 0.5-1 mm. in diameter, orange colored; teliospores 2-5 celled, linear, fusiform, 9-16 x 85-170 μ, not constricted at the septa, wall pale yellow, thin, about 1 μ, pores 2 in each cell (1 in the uppermost), apical." Kern in Bul. N. Y. Bot. Garden, v. 7, p. 466, 467 (1911).

948. *Myrica carolinensis* showing æcia. 949. Peridial cells, 1/12. 950. Aeciospores, 1/12. 951. Teleutospore, 1/12, from *Chamæcyparis thyoides.*

GYMNOSPORANGIUM FRATERNUM Kern.—On *Chamæcyparis thyoides.*

"O. Pycnia and æcia unknown.

"III. Telia foliicolous, from an annual mycelium, solitary, scattered, oval, 0.8-2 mm. across, pulvinate, chestnut-brown, ruptured epidermis usually noticeable; teliospore 2-celled, ellipsoid, 16-19 by 39-48 μ, rounded above, narrowed below, slightly constricted at the septum; wall cinnamon-brown, moderately thin, 1.5-2.5 μ, thicker above, 3-5 μ, the pores two in each cell, near the septum; pedicels cylindrical, uniform, 5-6 in diameter." North American Flora, v. 7, p. 191 (1912).

952. Teleutospores, 1/12, from *Chamæcyparis thyoides.*

GYMNOSPORANGIUM JUNIPERI-VIRGINIANÆ Schw.—On *Juniperus virginiana.*

"O. Pycnia epiphyllous, numerous, gregarious, more or less crowded in irregular groups, 1-5 mm. across, on discolored spots 5-15 mm. across, prominent, conspicuous, punctiform, honey-yellow becoming blackish, globoid, 110-125 μ in diameter by 110-130 μ high; ostiolar filaments 35-50 μ long.

"I. Aecia chiefly hypophyllous, crowded in annular groups 1.5-10 mm. across, on thickened discolored spots 5-15 mm. across, at first cylindrical, 1-2 mm. high, 0.1-0.4 mm. in diameter, peridium splitting extremely early and becoming very finely fimbriate to the base, strongly revolute; peridial cells usually seen only in side view, long and narrow, 10-16 by 65-100 μ; hygroscopic, becoming strongly

curved, when wet, the outer wall moderately thin, 2.5-3 μ, smooth, the inner wall coarsely rugose, moderately thick, 4-6 μ, the side walls rather sparsely rugose with ridges running from the inner side obliquely downward, extending about half-way across or more and becoming gradually broader, with shorter ridge-like papillæ in the intervening spaces; æciospores globoid or broadly ellipsoid, 16-24 by 21-31 μ; wall light chestnut-brown, moderately thick, 2-3 μ, finely verrucose, the pores distinct, 8-10 scattered. On various species of *malus*.

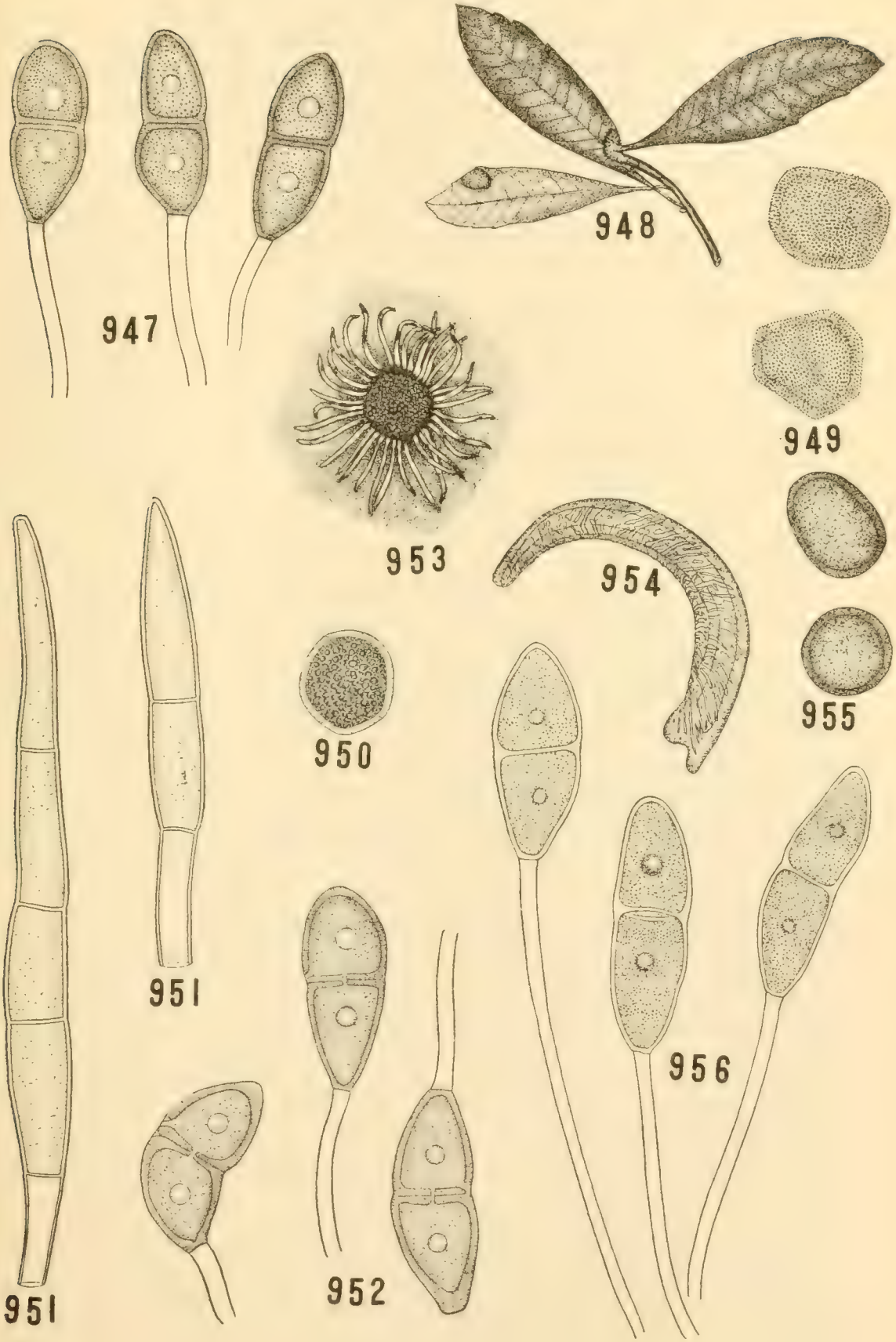
"III. Telia foliicolous, from an annular or biennial mycelium, appearing on globoid or reniform gall-like excrescences 5-30 mm. or more in diameter, rather evenly disposed, about 1.5-4 mm. apart, cylindrical or cylindrical-acuminate, becoming about 1.5-3 mm. in diameter by 10-20 mm. long when fully mature, golden-brown, becoming yellowish and pulverulent by germination, the ruptured tegumentary tissues raised about the base of the sori in an even ring-like manner; teliospores 2-celled, rhombic-oval or narrowly ellipsoid, 15-21 by 42-65 μ, obtuse or acute at both ends, slightly or not constricted at the septum; wall pale cinnamon-brown, uniformly thin, about 1 μ, the pores 2 in each cell, near the septum; pedicel hyaline, cylindrical, uniform, 3-5 μ in diameter, very long." North American Flora, v. 7, p. 209 (1912).

953. Aecidium from apple leaf, 2/3. 954. Peridial cell, 1/12. 955. Aeciospores, 1/12. 956. Teleutospores from *Juniperus virginiana*.

GYMNOSPORANGIUM GERMINALE (Schw.) Kern.—On *Juniperus* sp.

"O. Pycnia chiefly fructicolous, gregarious, in irregular groups, on slightly hypertrophied areas occupying part or all of the surface, prominent, conspicuous, honey-yellow becoming blackish, slightly flattened-globose, large 160-270 μ in diameter by 150-230 μ high; ostiolar filaments 90-150 μ long.

"I. Aecia fructicolous and caulicolous, crowded on hypertrophied areas of variable size on the twigs and peduncles, occupying part or usually all of the surface on the fruits, cylindric, 1.5-3 mm. high by 0.3-0 mm. in diameter; peridium whitish, becoming coarsely lacerate sometimes to base, erect or spreading peridial cells seen in both face and side views, not hygroscopic, remaining straight when wet, polygonal-ovate or polygonal-oblong in face view, 19-39 by 45-95 μ, rhomboidal in side view, 25-40 μ thick, the outer wall moderately thick, 3-5 μ, smooth, the inner wall very thick 13-23 μ, coarsely verrucose with rather loosely set, large, very irregularly branched papillæ, the side walls verrucose on the inner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half similar to the inner wall; æciospores globoid, large, 21-32 by 24-39 μ; wall pale yellow, thick, 3-4.5 μ, rather coarsely verrucose with crowded, slightly irregular papillæ, sometimes appearing reticulate, the pores 6-10, scattered, very obscure. On *Cydonia vulgaris* and *Cratægus* sp.

"III. Telia caulicolous, from a perennial mycelium, appearing on slight fusiform swellings, usually aggregated, roundish, 1-4 mm. across, often confluent, hemispherical, 1-3 mm. high, orange-brown; teliospores 2-celled, ellipsoid, 18-26 by 35-51 μ, roundish or somewhat acutish above, obtuse below, slightly or not constricted at the septum; wall yellowish, thin, 1-2 μ, slightly thicker at apex, 2-3 μ, the pores 1 in each cell, apical in the upper, near the pedicel in the lower cell; pedicel in the lower cell; pedicels carotiform, 9-19 μ in diameter near the spore, very long." North American Flora, v. 7, p. 197 (1912).

957. Distorted twig of *Cratægus* sp. showing æcia. 958. Peridial cells, 1/12. 959. Aeciospores, 1/12. 960. Teleutospores, 1/12.

GYMNOSPORANGIUM GLOBOSUM Farl.—On *Juniperus virginiana.*

"O. Pycnia epiphyllous, numerous, gregarious, more or less crowded in irregular groups 1-3 mm. across, on discolored spots 3-7 mm. across, prominent, conspicuous, honey-yellow becoming blackish, slightly flattened, globose, 150-190 μ in diameter by 115-175 μ high; ostiolar filaments 65-80 μ long.

"I. Aecia chiefly hypophyllous, crowded in irregular annular groups, 2-7 mm. across, on thickened, discolored spots 3-12 mm. across, cylindrical, 1.5-3 mm. high by 0.1-0.2 mm. in diameter; peridium soon splitting in the upper part, becoming reticulose half way to the base, the margin finely lacerate or fimbriate, erect; peridial cells seen in both face and side views, not hygroscopic, remaining straight when wet broadly lanceolate in face view, 15-23 by 60-90 μ; linear-rhomboidal in side view, 13-19 μ thick, the outer wall rather thin, about 1.5 μ, smooth, the inner and side walls moderately thick, 3-5 μ, rather densely rugose with ridges of varying length; æciospores globoid or broadly ellipsoid, 15-19 by 18-25 μ; wall light chestnut-brown, 1.5-2 μ thick, finely verrucose, the pores distinct, 6-8, scattered." On *Malus* sp.

"Telia caulicolous, from a perennial mycelium, appearing on irregular globoid gall-like excrescences 3-25 mm. in diameter, unevenly disposed, sometimes densely aggregate, often separated by the scars of the sori of previous seasons, tongue- or wedge-shaped, becoming about 1.5-3 mm. broad by 2-5 mm. long at the base by 6-12 mm.

high when fully mature, chestnut-brown becoming yellowish and pulverulent by germination; teliospores 2-celled, ellipsoid, 16-21 by 37-48 μ, somewhat narrowed above and below, slightly constricted at the septum, wall pale cinnamon-brown, uniformly thin, 1-2 μ, the pores 2 in each cell, near the septum; pedicel cylindrical, uniform, 4-7 μ, in diameter, very long." North American Flora, v. 7, p. 204-206 (1912).

961. Peridial cell, 1/12. 962. Aeciospores, 1/12. 963. Teleutospores, 1/12, from *Juniperus virginiana.*

GYMNOSPORANGIUM TRANSFORMANS (Ellis.) Kern.—On *Aronia arbutifolia* and *Amelanchier* sp.

"O. Pycnia chiefly epiphyllous and fructicolous, gregarious, rather crowded in small groups 0.5-1 mm across, on discolored spots 2-7 mm. across, noticeable, honey-yellow becoming brownish, globoid, rather large, 144-170 μ in diameter by 112-150 μ high; ostiolar filaments 60-75 μ long.

"I. Aecia hypophyllous, caulicolous, and fructicolous, occasionally solitary, usually gregarious, sometimes few together but more often aggregate in large groups, borne in gall-like, frustum-shaped protuberances (1-2 mm. high) of a reddish-brown color and more or less consolidated at the bases in the groups, at first cylindrical, 2-2.5 mm. high by 0.2-0.4 mm. in diameter; peridium soon becoming finely fimbriate to base, partially dropping away, and narrow hygroscopic, becoming curved or even coiled when wet, 12-18 μ thick by 150-300 μ long, or more, in the sides of the peridium, much shorter toward the apex, the outer wall rather thin, 2-3 μ, smooth, the inner wall, 4-6 μ thick, rather coarsely verrucose, the side walls verrucose on inner half with roundish or somewhat irregular papillæ, more thickly crowded toward the inner side, the outer half of the side walls smooth; æciospores globose, small, 18-22 μ in diameter; wall light cinnamon-brown, 1.5-2.5 μ thick, rather finely verrucose, the pores 6-8 scattered." North American Flora, v. 7, p. 202 (1912).

III. Telia on leaves of *Chamæcyparis.*

964. Leaves of *Amelanchier* showing æcia. 965. Peridial cell, 1/12. 966. Aeciospore, 1/12.

UROMYCES APPENDICULATUS (Pers.) Lév.—On beans.

"O. Pycnia epiphyllous, in small groups, rather large, papillose, honey-yellow, globoid, 100-125 μ in diameter.

"I. Æcia hypophyllus, in small often annular groups, 2-3 mm. across, short, cupulate, peridium white, margin spreading or some-

what revolute, lacerate, peridial cells rhomboidal or linear rhomboidal, somewhat over-lapping, 10-13 μ, broad, by 24-30 μ long, the outer wall moderately thick, 4-5 μ, transversely striate, the inner wall thinner, 2-3 μ, verrucose, æciospores ellipsoid, 16-20 by 20-26 μ, wall colorless, thin, 1-1.5 μ, minutely and closely verrucose.

"II. Uredinia amphigenous, scattered, roundish, small about 0.5 mm. or less in diameter, soon naked, cinnamon-brown somewhat pulverulent, ruptured epidermis evident; urediniospores ellipsoid, obovoid, or subglobose, 16-23 by 20-33 μ; wall light golden-brown, rather thin 1-1.5 μ, sharply and sparsely echinulate, the pores 2, rarely 3, equatorial.

"III. Telia amphigenous, scattered, roundish, about 0.5 in diameter, early naked, blackish-brown, somewhat pulverulent, ruptured epidermis evident; teliospores broadly ellipsoid or subglobose, 20-26 by 24-32 μ, rounded or obtuse above, usually rounded below; wall dark chestnut-brown, rather thick, 3-3.5 μ with a large hemispherical hyaline apiculus above making the wall 6-10 μ thick, smooth or with a few small, sparsely scattered hyaline papillæ; pedicel, hyaline, about as long as the spore." In North American Flora, v. 7, p. 257 (1912) as *Nigredo appendiculata.*

967. Leaflet of bean showing uredo sori. 968. Uredospores, 1/12. 969. Leaflet showing teleuto sori. 970. Teleutospores, 1/12.

UROMYCES CARYOPHYLLINUS (Schrank) Winter.—On the leaves of the cultivated carnations. Described by McAlpine as follows:

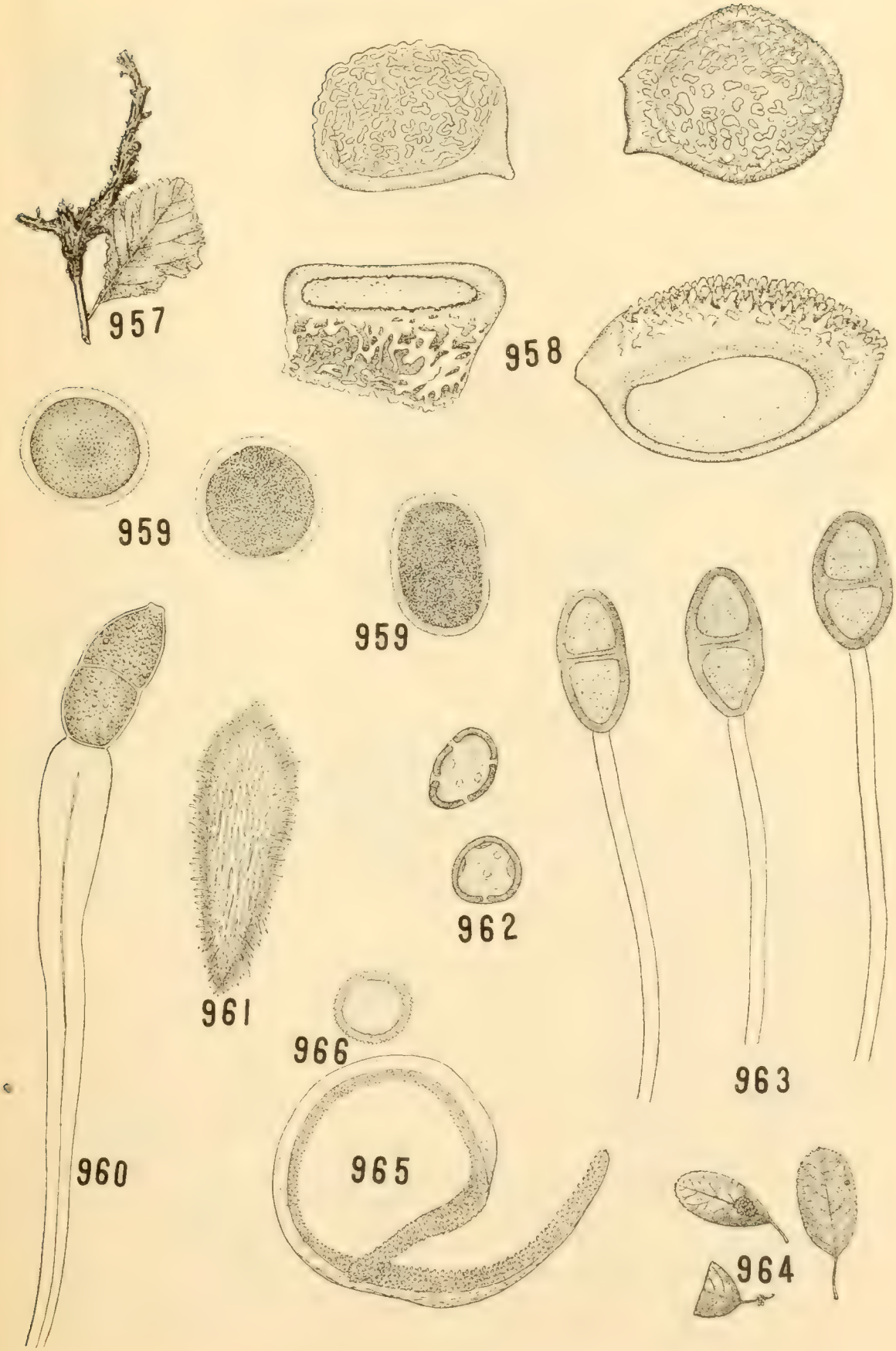
"Uredosori amphigenous, dark brown when exposed, but long covered by epidermis, round or oblong, scattered, often confluent up to 3 mm. long.

"Uredospores roundish or oblong, yellowish-brown to golden-brown, decidedly echinulate, generally 3-4 scattered or nearly equatorial germ-spores on one face, 21-34 x 17-28 μ, average 32 x 24 μ.

"Teleutosori amphigenous, blackish-brown, oblong, confluent in elongated lines, long, covered by ashy epidermis, then margined by the ruptured and ragged cuticle.

"Teleutospores at first intermixed with uredospores, roundish, oval or ovate, cinnamon-brown, generally thickened, with broad colorless papilla, average 28 x 20 μ or 22-32 x 17-23 μ; pedicels very deciduous, hyaline, up to 45 μ long." McAlpine, Rusts of Australia, p. 102.

971. Portion of infected carnation showing sori on stem and leaves. 972. Cross-section of uredo sorus on leaf, 2/3. 973. Uredospore, 1/12. 974. Teleutospores, 1/12. 975. Intercellular mycelium and haustoria, 1/12.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UROMYCES HOWEI (Peck) Arth.—On *Asclepias* sp.

"O. Pycnia and æcia unknown.

"II. Uredinia hypophyllous, scattered, roundish, 0.5 mm. across, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores globoid, 18-25 by 23-28 μ; wall golden brown, thin, 1-1.5 μ, evenly echinulate, the pores 4, equatorial.

"III. Telia hypophyllous, thickly scattered, roundish, 0.5 mm. across, early naked, pulverulent, light chestnut-brown, ruptured epidermis noticeable; teliospores broadly ellipsoid or globoid, 18-23 by 20-30 μ, rounded or somewhat obtuse at both ends; wall chestnut brown, rather thin, 1.5 μ, slightly thicker above owing to presence of a small semi-hyaline papilla, finely and closely verrucose; pedicel colorless, fragile, short." In North American Flora, v. 7, p. 264 (1912) as *Nigredo howei.*

976. Uredospores, 1/12 from *Asclepias* sp. 977. Teleutospores, 1/12.

PUCCINIA ANTIRRHINI Dietel & Holw.—On cultivated snapdragon in greenhouses and in the garden. Producing on the average uredospore sori which are chestnut-colored, uredospores elliptical or globose, 23-30 x 21-25 μ, chestnut-colored, minutely echinulate, germinating pores 2 rarely 3; teleutospore sori cushion-shaped, dark, on pale spots on foliage or scattered upon dry spots, amphigenous, particularly hypophyllous on the average or minutely irregularly scattered on large stems, surrounded by a split epidermis, confluent, teleutospores oblong or irregular, apices conical, rotund or truncate, bases attenuate, rarely rounded, at septa moderately constricted, epispore obscurely chestnut-colored or faintly dark, apices somewhat thickened, covering smooth, 36-50 x 17 x 26 pedicel long. Hedwigia, v. 36, p. 298 (1897).

978. Infected leaves of *Antirrhinum majus.* 979. Uredospores, 1/12. 980. Infected stem of *A. majus.* 981. Teleutospores, 1/12.

PUCCINIA ASPARAGI D. C.—On cultivated asparagus. Described by Holway as follows:

"O. Spermagonia yellow, clustered in the center of the groups of æcidia.

"I. Aecidia on the stems, scattered or collected in irregular, oblong groups, low margin incised not reflexed; æcidiospores yellow globose to polygonal, finely verrucose, 16-28 μ in diameter.

"II. Uredosori cinnamon-brown, oblong, sometimes confluent up to 4 mm. in length, surrounded by the ruptured epidermis; uredospores globose to ovate, minutely echinulate, 20-32 x 20-24 μ; germpores 5.

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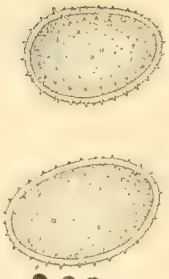

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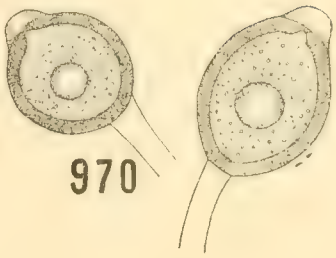

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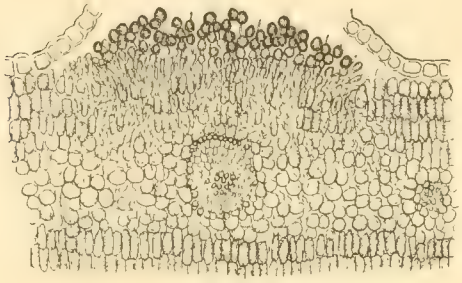

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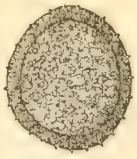

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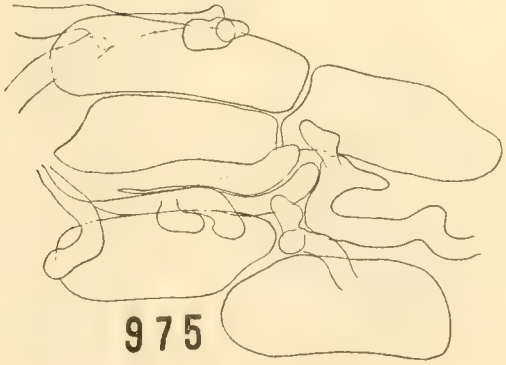

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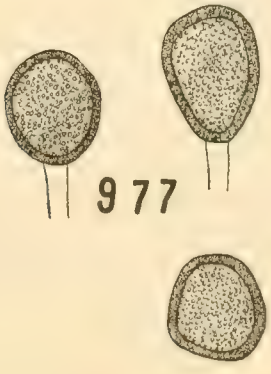

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"Teleutosori dark-brown, round to oblong or elliptical, often thickly covering the entire plant, pulvinate, firm; teleutospores chestnut-brown, smooth, elliptical to oblong, apex rounded, up to 8 μ thick, lower cell mostly rounded, rarely narrowed to the pedicel, slightly constricted, 32-48 x 18-24 μ; pedicel persistent, tinted, varying in the same sorus from short up to 80 μ long." Holway, C. W. D.—North American Uredineæ, v. 1, p. 27 (1905).

982. Infected stem of asparagus. 983. Aeciospores, 1/12. 984. Uredospore, 1/12. 985. Teleutospores 1/12.

PUCCINIA CANALICULATA (Schw.) Lagerh.—On *Cyperus* sp.

"O. Pycnia amphigenous in small, confluent groups, honey-yellow becoming brownish, subepidermal, globoid, small.

"I. Aecia hypophyllous, in circular or elongated groups, 0.3-0.8 mm. across, on discolored, unthickened spots, low cupulate, small, 0.2-0.3 mm. in diameter; peridium colorless, the margin finely eroded and slightly recurved; peridial cells oblong, 16-23 x 23-29 μ, slightly overlapping, the outer wall smooth, 5-8 μ thick, transversely striate, inner wall moderately verrucose, thinner, 2-4 μ; æciospores angularly globoid or broadly ellipsoid, 13-16 x 15-19 μ, the wall thin, 1 μ or less, colorless, finely and inconspicuously verrucose.

"II. Uredinia hypophyllous, scattered, oblong, 0.5-2 mm. long, dehiscent by a longitudinal slit, cinnamon-brown, pulverulent, ruptured epidermis evident; urediniospores ellipsoid to obovoid, 15-21 x 23-30 μ; wall moderately thin, 1.5-2 μ, cinnamon-brown, finely and closely echinulate, pores 2, rarely 3, equatorial.

"III. Telia hypophyllous, oblong or linear, 0.5-2 mm. long, chocolate-brown, covered by the epidermis, tardily dehiscent by a longitudinal slit; teliospores oblong or cylindrical, 15-22 x 42-44 μ, truncate, obtuse or rounded above, narrowed or rounded below, slightly or not constricted at the septum; wall moderately thin, 1-2 μ, smooth considerably thickened at the apex, 6-10 μ chestnut-brown above, paler below; pedicel tinted, one-half the spore lenght or less." Dr. J. C. Arthur's manuscript.

On *Cyperus esculentus*. 986. Uredospores, 1/12. 987. Teleutospores, 1/12.

PUCCINIA CHRYSANTHEMI Roze.—On the foliage of greenhouse chrysanthemums.

"II. Uredosori on both surfaces of leaf, but mostly hypophyllous, sparingly on stem, generally round, soon naked, powdery, scattered

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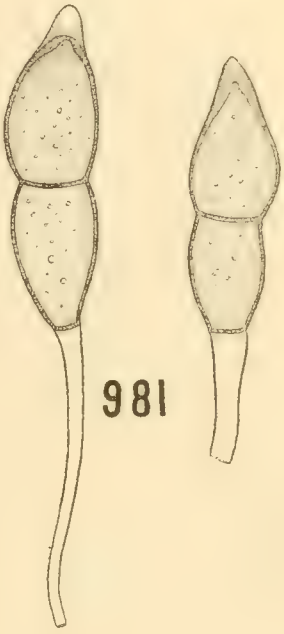
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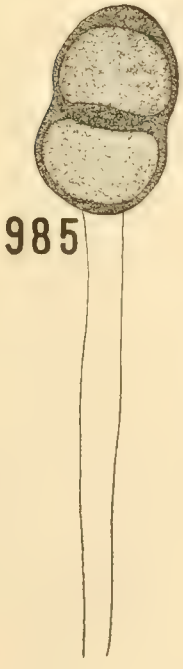
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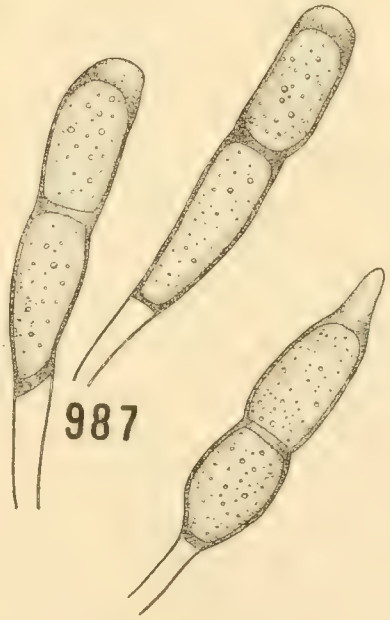
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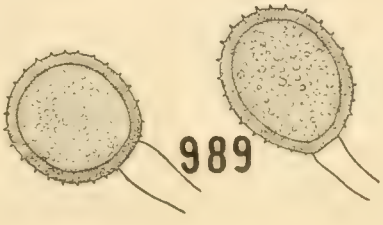
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or crowded, often confluent, sometimes arranged circularly, snuff-brown, average 1-1½ mm. diam., causing dirty-brown, indefinite spots on upper surface of leaf, which gradually extend and ultimately decay.

"Uredospores ellipsoid to obovoid, yellowish-brown to golden-brown, echinulate, with 3 equatorial germ-spores on the face, 28-35 x 22-25 μ (32 μ long very common, occasionally reaching a length of 45 μ) ; pedicels hyaline, rarely persistent, stout, long, up to 60 μ.

"III. Teleutosori on both surfaces of leaf, but chiefly on under surface, prominent, roundish, pulvinate, solitary or confluent in groups, often concentrically arranged, dark-brown to black, soon naked, compact. "Teleutospores at first sparingly intermixed with uredospores, ellipsoid to pear-shaped or clavate, rounded or occasionally truncate at apex, and thickened (up to 9 μ) mostly rounded at base or sometimes slightly attenuated, chestnut-brown, with strong, finely punctulate epispore, 35-60 x 19-28 μ; pedicel hyaline, stout, persistent, 40-80 x 7-9 μ." McAlpine—Rusts of Australia, p. 153 (1906).

988. Infected leaf of *chrysanthemum* sp. 989. Uredospores, 1/12.

PUCCINIA CORONATA Cda. — On oats. Described by Sydow as follows:

"Aecidia hypophyllous, on the petiole, spots yellow or yellowish-purple, depressed in a circular fashion or irregularly distributed, distorting the foliage, and especially the petiole, cylindrical margin white, lacerated, folded back, æcidiospores angular to globose, delicately verrucose, golden colored, 16-25 x 12-20 μ; uredosori hypophyllous, scattered or in series, sometimes confluent, more or less oblong, pulverulent, golden-colored, uredospores globose, subglobose or ovate, echinulate, yellow 20-30 x 16-24 μ possessing 3-4 germination pores, paraphyses few, intermingled, teleutosori hypophyllous for the most part irregularly scattered, sometimes confluent, oblong or linear, covered a long time by the epidermis, at length naked, dark, teleutospores clavate, apices flattened, crowded with denticulate out-growths, middle not or very little constricted, base attenuate, smooth, brown, 35-36 x 12-22 μ; pedicel short, somewhat broad."

Hab. Aecia on leaf blade and petioles of *Rhamnus* sp., uredo and teleuto sori on leaves of oats, etc.

990. Uredospores, 1/12. 991. Teleutospores, 1/12.

PUCCINIA CYANI (Schleich.) Pass.—On cultivated *Centaurea cyanus.*

"II. Uredosori mostly hypophyllous, scattered or crowded, minute, orbicular or elliptic, pulverulent, reddish-brown.

"Uredospores yellowish-brown, globose, subglobose to ellipsoid finely echinulate, with two germ-pores on one face, 25-27 x 19-24 μ.

"III. Teleutosori amphigenous, and on stem, scattered pulverulent, dark-brown, orbicular to elliptic, soon naked, ½-1 mm.

"Teleutospores intermixed with uredospores, chestnut-brown, ellipsoid, rounded at both ends, unthickened at apex, not constricted at septum, delicately warted, germ-pores conspicuous, 30-40 x 22-30 μ; average 32 x 24 μ; epispore about 3 μ thick; pedicel hyaline, short, deciduous." McAlpine—Rusts of Australia, p. 156 (1906).

992. Uredospores, 1/12.

PUCCINIA DOUGLASII E. & E.—Teleutospore sori minute, 1/3-1/2 mm. naked, surrounded by the adnate epidermis, pale, chestnut-brown color, often born in series, teleutospores oblong-ellipsoid 25-55 x 12-15 μ, chestnut-colored, constricted, apices rotund or obtusely long-pointed; epispore smooth, apices distinctly thickened, apex papillate or without a papilla.

Saccardo, P. A., Sylloge Fungorum, v. 11, p. 192.

993. Teleutospores, 1/12.

PUCCINIA EMACULATA Schw.—On *Panicum capillare.* Described by Burrill as follows:

" II, III. Mostly epigenous, sometimes amphigenous. Sori small, rather prominent, mostly very numerous, irregularly scattered or crowded, rarely confluent on the leaves, but on the sheaths forming long, irregular lines, black, rather early erumpent, but long surrounded by the ruptured epidermis; uredospores subglobose, epispore rather thin, sharply but minutely echinulate, 15-24 μ; teleutospores elliptical or broadly clavate, slightly constricted, vertex strongly thickened and obtusely pointed or rounded, narrowed below, smooth, not deeply colored, 15-21 by 30-48 μ; pedicel once to once and a half as long as the spore, tinted." Parasitic Fungi of Illinois, v. 1, p. 201.

994. Uredospore, 1/12. 995. Teleutospore, 1/12.

PUCCINIA GRAMINIS Pers.—On wheat and grasses. Described by McAlpine as follows:

"II. Uredosori amphigenous, yellowish-brown, linear, 2-3 mm. or longer, either scattered or confluent in long streaks, especially on sheaths, pulverulent, soon naked, surrounded by ruptured epidermis.

"Uredospores elongated ellipsoid to ovate oblong, brownish-yellow, echinulate, generally with 3-4 equatorial germ-pores on one face 20-36 x 14-18 μ."

"III. Teleutosori sparingly on leaf blades, more commonly on sheaths, stalks and inflorescence, linear, elongated, pulvinate, often confluent, up to 10 mm. or more, dark brown to dense black, soon rupturing epidermis which is prominent.

"Teleutospores clavate to oblong-clavate, chestnut-brown, smooth somewhat constricted at septum, very rarely 3-celled, 35-63 x 14-25 μ, average 52- x 18 μ, upper cell rounded or pointed at apex, rarely truncate, considerably thickened (up to 12 μ) sometimes as broad as long 21-29 μ long; lower cell attenuated towards base, equal to or longer than upper, 18-35 μ long; pedicel persistent, elongated, tinted, and sometimes as deeply colored as spore, of equal thickness throughout, up to 73 x 8 μ.

"Mesospores very common, intermixed in the same sorus with uredo and teleutospores, similarly colored, dark chestnut or paler, oblong to elongated ellipsoid, generally slender, rounded, pointed or truncated apex and thickened like teleutospore, smooth, 34-46 x 10-15 μ; pedicel generally short or of moderate length. Occasionally an obovate form occurs, deeply colored, rounder and thickened at apex and much broader than usual, up to 22 μ, with elongated pedicel."—McAlpine, Rusts of Australia, p. 120 (1906).

Note:—We find this rust on the stems only.

996. Infected wheat culm. 997. Uredospores, 1/12. 998. Teleutospores, 1/12.

PUCCINIA GROSSULARIÆ (Schum.) Lagerh.—On *Carex pallescens*. Described by Arthur (manuscript) as follows:

"O. Pycnia chiefly epiphyllous, gregarious, on discolored spots, usually in groups, 0.5-1.5 mm. across, honey-yellow becoming darker with age, flattened globose, 80-180 μ in diameter; 75-150 μ high, ostiola filaments 65-100 μ long.

"I. Aecia chiefly hypophyllous, but appearing also on the twigs, petiole and young fruits, gregarious, usually appearing on more or less orange-colored hypertrophied areas, 2-8 mm. across, cupulate, 0.2-0.3 mm. in diameter, peridium short, spreading, the margin slightly recurved, irregularly dentate, peridial cells rhomboidal, 21-27

μ long, the outer wall 6-8 μ thick, striate, the inner wall 3-5 μ, verrucose, æciospores globose, 13-18 x 15-21 μ, wall colorless, thin, about 1 μ, very finely verrucose."

On *grossulariaceæ.*

II. Uredinea chiefly hypophyllous, scattered, oval, or oblong, 0.1-0.5 mm. long, early naked, on some hosts rather tardily naked, somewhat pulverulent, ruptured epidermis usually not conspicuous, urediniospores globose, broadly ellipsoid or obovoid, 15-21 x 19-24 μ (rarely larger, up to 25 to 34 μ) wall golden-brown or chestnut-brown, 1.5-2 μ thick, moderately finely and evenly echinulate, the pores 2-4, usually 3, equatorial (or sometimes) partly or wholly (near the hilum).

III. Telia chiefly hypophyllous, scattered, rounded or oblong, 0.1-0.2 mm. broad by 0.1-0.5 mm. long, sometimes appearing longer when confluent end to end, early naked with ruptured epidermis not conspicuous, pulvinate, blackish-brown, or on some hosts long, covered by the epidermis and greyish to black, teliospores broadly clavate, 14-24 x 32-58 μ, roundish truncate, or rarely accuminate above, slightly or not constricted at the septum, wall cinnamon or light chestnut-brown, 1-1.5 μ thick, thick at the apex, 4-10 μ, smooth, pedicel one-half length of spore or less, slightly tinted.

999. Uredospores, 1/12, on *Carex pallescens.*

PUCCINIA HELIANTHI Schw.—On *Helianthus annuus.* Described by McAlpine as follows:

"O. Spermogonia honey-colored, in small clusters. Aecidia crowded or orbicular, or arranged in broadly expanded, oblong spots; pseudoperidia cylindrical, plane, with white laciniate margins.

"I. Aecidiospores orange red, ellipsoid to polygonal, finely echinulate, 21-28 x 18-21 μ.

"II. Uredosori roundish, chestnut-brown, scattered or confluent, pulverulent, often on yellow or pale green spots on upper surface of leaf, but generally forming brown mass on under surface.

"Uredospores subglobose, elliptic or obovate, golden yellow, echinulate, epispore subhyaline, showing one germ pore on one face, 21-24 μ diam. Or 24-29 x 15-22 μ.

"III. Teleutosori roundish, dark brown or black prominent, scattered at first, but ultimately in clusters, confluent, dotting both surfaces of leaf, but most prominent on under.

"Teleutospores at first intermixed with uredospores, chestnut-brown, oblong-elliptical or pear-shaped, smooth, but occasionally a

little rough at apex, slightly constricted at septum, thickened at apex (6-9 μ), generally rounded at base, 36-50 x 21-27 μ, shade darker than lower, and rather larger, 22-29 x 21-27 μ; lower cell either the counterfeit of upper or slightly tapering toward base, 17-23 x 20-22 μ, pedicel hyaline, persistent, generalyy much longer than spore, up to 90 and 110 μ long." McAlpine, Rusts of Australia, p. 158 (1906).

1000. Teleutospore, 1/12.

PUCCINIA IMPATIENTIS (Schw.) Arth. (*Puccinia argentata* (Schultz) Winter.) *Uredo impatientia; (Cœoma impatienta; Puccinia papillata*).—On *Impatiens biflora.*

"Hypogenous. Spots sometimes definite, purple, yellow-bordered, more often effused, on the leaves scarcely thickened, on the petioles and stems swollen; æcidia subcircinate or irregularly scattered, short, deeply and rather coarsely split and much recurved; spores subglobose or elliptical (vertical diameter shorter), epispore thin, apparently smooth, contents finely granular, 15-18 by 18-20 μ; spermogonia clustered above in the center of the definite spots, otherwise sparsely scattered on both sides of leaf." Burrill, Parasitic Fungi of Illinois, p. 224.

"Uredospore sori ochraceous or faintly cinnamon-colored, little congested, globose or ellipsoid, spores 16-20 x 14-16 μ, slightly roughened, faintly yellowish, pedicel long, teleutospore sori chestnut-brown, forming spots, often confluent spores elliptical; oval or subclavate, constricted in the middle, apices rotund or attenuated, tip of the apex hyaline, 25-25 x 12-20 μ, brown, granular, smooth, pedicel short, slender, hyaline."

Saccardo, P. A., Sylloge Fungorum, v. 7, p. 639.

1001. Aeciospores, 1/12, on *Impatiens biflora.*

PUCCINIA MACROSPORA (Peck) Arthur.—Described by Arthur (manuscript) as follows:

"O. Pycnia epiphyllous, few in groups on slightly discolored spots, not conspicuous, subepidermal, in vertical section, flattened-globoid, 128-160 μ in diameter, by 80-100 μ high.

"I. Aecia hypophyllous, chiefly in annular groups, 1.5-5 mm. across, rather short, 0.1-0.2 mm. in diameter; peridial cells linear, rhomboidal 32-42 μ long, outer wall thin, smooth, inner wall somewhat thicker, moderately verrucose, æciospores globoid, very large, 37-51 x 32-42 μ, wall colorless, medium thick, 1.5-2.5 μ thicker above 5-10 μ, rather coarsely verrucose, æcia on *Smilax* sp.

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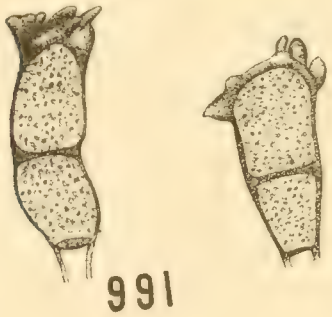
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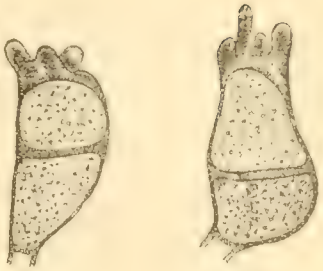
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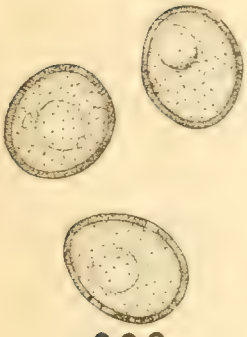
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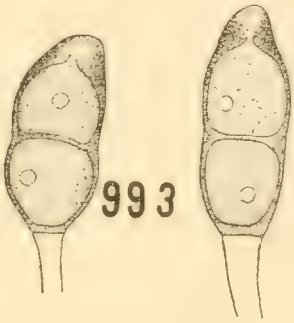
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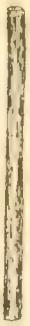
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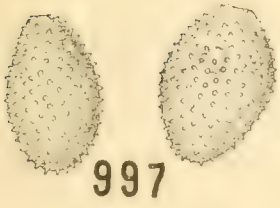
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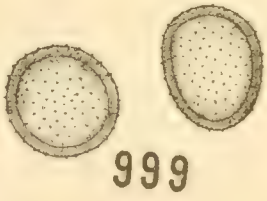
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"II. Uredinia amphigenous, scattered or in longitudinal series, oblong, 0.5-1 mm. long, tardily dehiscent, urediniospores obovate or narrowly ellipsoid, rather irregular, very large, 40-60 x 26-37 μ, often narrowed below to a thickened hilum, wall golden yellow, evenly thick, 2.5-3.5 μ, echinulate, with prominent points, 3-4 μ apart, pores obscure, 2 or sometimes 3, equatorial.

"III. Telia chiefly hypophyllous, scattered or in longitudinal series, oblong or linear, 0.5-1.5 mm. long, finally naked, pulvinate, chocolate-brown, ruptured epidermis noticeable, teliospores clavate, 61-67 x 16-23 μ, usually rounded or obtuse above, narrowed below, usually slightly constricted at the septum; wall pale cinnamon-brown, paler below, medium thin, 1.5-2.5 μ, much thicker at the apex, 9-16 μ, pedicel nearly colorless, one half to one length of the spore. Telia on carex.

1002. Infected leaf of *Smilax* sp. 1003. Aeciospore, 1/12.

PUCCINIA MALVACEARUM Mont.—On the cultivated hollyhock and other species of *Malva*. Described by McAlpine as follows:

"III. Teleutosori generally hypophyllous, brown to reddish-brown or orange, but grayish when spores are germinating, compact, round, pulvinate elongate on stems, scattered or crowded, seldom confluent, at first covered by epidermis, soon naked.

"Teleutospores fusiform, attenuated at both ends, apex sometimes rounded, slightly constricted at septum or not at all, apical thickening slight, smooth, yellowish-brown, rarely tricellular, 35-75 x 12-26 μ, average 50 x 17 μ; pedicels firm, long persistent, occasionally septate, sometimes measuring 170 μ long.

"X. Mesospores occasional, same color as teleutospores, somewhat fusiform, slightly thickened at apex, 40-45 x 17-19 μ." McAlpine, Rusts of Australia, p. 178 (1906).

1004. Infected leaf of cultivated hollyhock. 1005. Teleutospore, 1/12.

PUCCINIA MENTHÆ Pers.—On *Kœllia virginiania*. Described by Sydow as follows:

"Pycnia disposed in small groups or scattered, honey-colored, æcidia hypophyllous or often on the stem, reddish-purple spots on the foliage and in groups more or less regular on stems, petioles and veins of the leaves, producing distortions, æcia opening irregularly, margin hardly or irregularly lacerated, erect or curved, very little within, æcidiospores subglobose, ellipsoid or with many angles, verrucose, pale yellow, 24-40 x 17-28 μ; uredosori hypophyllous, yel-

lowish or brown, orbicular or elliptical, scattered or aggregated, surrounded by the ruptured epidermis at maturity naked, now and then confluent, cinnamon-brown, uredospores globose, subglobose, ellipsoid or obovate, echinulate, pale brown 17-28 x 14-19 μ, teleutospores sori hypophyllous, rarely on the stem, scattered or aggregated, minute, now and then confluent, orbicular, pulverulent, black-brown, teleutospores ellipsoid, ovate or subglobose, rounded at both extremities, apex with a pale or hyaline papilla, middle of spore not or hardly constricted, verrucose, dark-brown, 26-35 x 19-23 μ, pedicel long, delicate and hyaline."

1006. Teleutospore, 1/12, on species of mint.

PUCCINIA POLYSORA Underwood.—On *Tripsacum dactyloides*. Described by Underwood as follows:

"II, III. Amphigenous; sori very small, short, very numerous but irregularly scattered, remaining long enclosed in the tough epidermis of the host, at length rupturing by a narrow slit; uredospores large, broadly oval, 35 x 30 μ, scarcely echinulate, the epispore or medium thickness, pale rusty brown; teleutospores variable, usually short, irregularly oblong, often somewhat constricted at the septum, averaging 25 x 40 μ, the cells often irregularly angled, the upper usually broader than longer, blunt or rounded above; apex not thickened; pedicel usually short."

1007. Uredospores, 1/12.

PUCCINIA SAMBUCI (Schw.) Arthur. — On *Carex bullata*. Described by Arthur (manuscript) as follows:

"O. Pycnia chiefly epiphyllous and caulicolous, numerous, gregarious, more or less crowded in orbicular groups, 1-5 mm. across, conspicuous, punctiform, orange-yellow becoming brownish, globoid, 120-155 μ in diameter, 112-144 μ high, ostiolar filaments 50-90 μ.

"I. Aecia hypophyllous and caulicolous, crowded in orbicular groups on the leaves, 0.1-0.5 mm. or more across on thickened, discolored spots, or crowded over hypertrophied areas, often of considerable extent, on the stem and petiole, short 0.3-0.7 mm. in diameter, bright orange-yellow, peridia colorless, margin recurved, erose, peridial cells squarish in longitudinal sections, isodiametric, 15-25 μ, inner wall moderately thick, 3-4 μ, verrucose, outer walls thick, 7-12 μ, striate, smooth, æciospores globoid, 15-19 in diameter, wall pale yellow, thin, about 1 μ, finely verrucose.

"II. Uredinia chiefly hypophyllous, scattered, elliptical, 0.1-0.3 mm. broad by 0.2-0.7 mm. long, early naked, pulverulent, chestnut-brown, ruptured epidermis conspicuous, urediniospores lenticular or ellipsoid, 17-21 x 23-32 μ; wall light chestnut-brown, about 1.5 μ thick, rather finely echinulate, the pores 2, in the upper part near apex.

"III. Telia chiefly hypophyllous, scattered, oblong, or lemon-oblong, 0.3-0.6 mm. broad by 0.4-5 mm. or more long early naked, pulvinate, dark chocolate-brown, surrounding epidermis conspicuous, teliospores, clavate-oblong or clavate, 15-25 x 42-65 μ, rounded above, usually narrowed below, somewhat constricted at the septum, wall chestnut-brown, concolorous, 1.5-2 μ thick, thicker at apex, 7-13 μ, smooth pedicel nearly or quite colorless about length of spore."

1008. Infected petiole and bud of *Sambucus* sp. showing æcia. 1009. Aeciospore, 1/12. 1010. Teleutospores, 1/12, from *Carex bullata* var. *greenii*.

PUCCINIA SMILACIS Schw.—On smilax. Described by Sydow as follows:

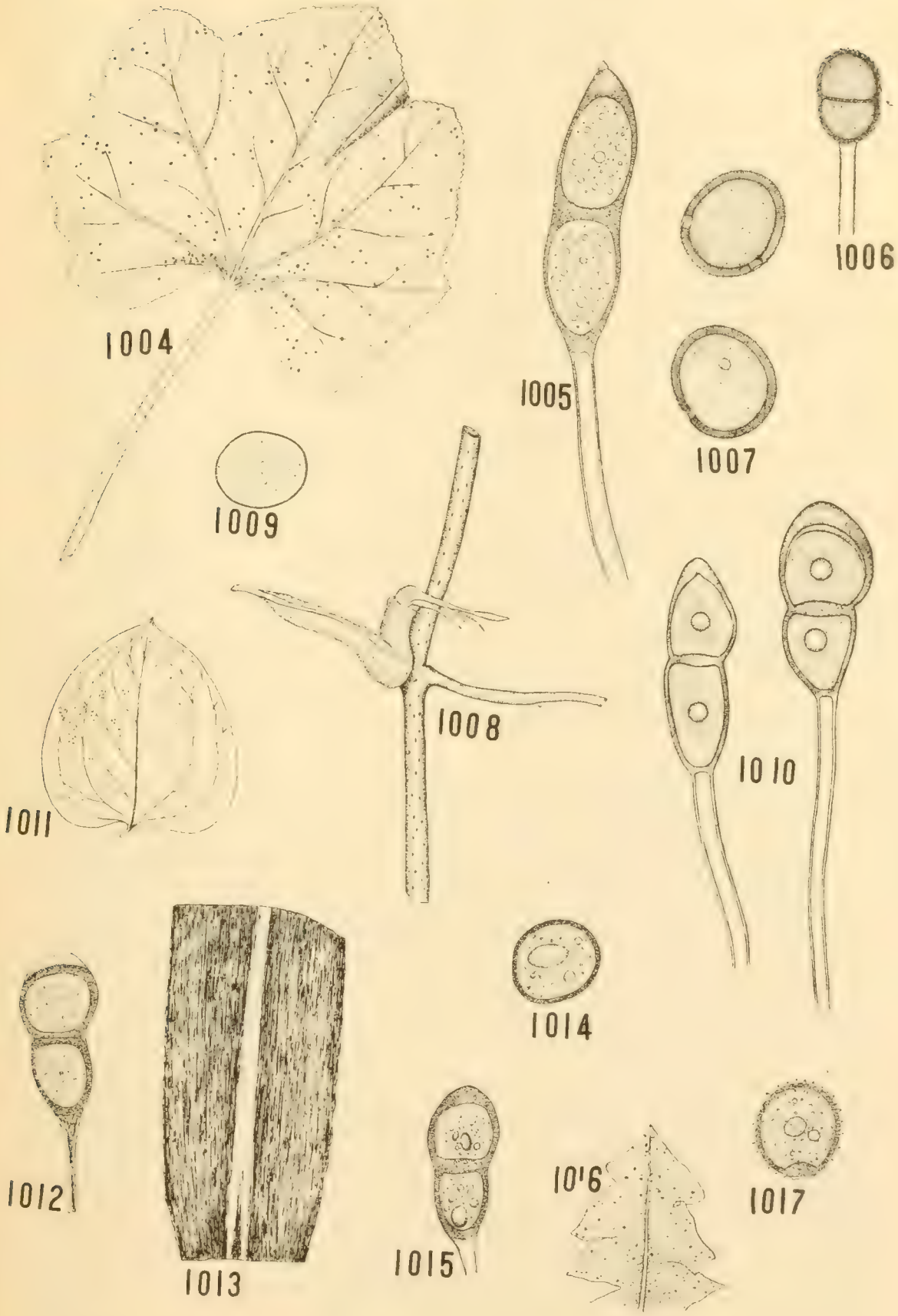
"Uredospore sori hypophyllous, spots orbicular or irregular, often confluent, for the most part brick red, scattered or irregularly circinate, minute, rotund, or oblong, surrounded by ruptured epidermis, pulverulent, uredospores subglobose or ovate, delicately echinulate pale, 21-28 μ in diameter, teleutospore sori, hypophyllous, scattered, grouped or circinate, rotund or irregular, minute, subpulvinate, surrounded by ruptured epidermis, black teleutospores ellipsoid-oblong or oblong, apex rotund or obtuse, thickened (15-12 μ) middle constricted, base rotund or slightly attenuate, chestnut-brown, smooth,* 35-45 x 16-22 μ, pedicel brown, thick, long."

1011. Infected leaf of *Smilax* sp. 1012. Teleutospore, 1/12.

PUCCINIA SORGHI Schw. (*Puccinia maydes* Bereng).—On the foliage, sheaths and stems of corn.

"Sori of uredospores amphigenous, numerous, elliptical or spherical, scattered or close together, therefore confluent, convex, at maturity swelling out or pushing out the epidermis which ruptures in a longitudinal fashion, brown, becoming reddish; uredospores globose, elliptical or ovate, 23-30 x 22-26 μ, somewhat verrucose, sometimes guttulate, at first yellowish, at length reddish-brown; pedicel short cylindrical, hyaline; sori of teleutospores of various forms, for the most part linear, or oblong, prominent amphigenous, subepidermal, white, at length, rupturing there, becoming convex, superfi-

*On *Smilax* sp.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cial and dark; teleutospores ovate-oblong or clavate, obtuse, constricted in the middle, upper cells sometimes long-pointed; epispore thick, at first dirty-yellow in color, at length dark brown, at maturity quite dark, 28-45 x 12-17 μ, smooth, pedicel elongate about 5 μ thick, cylindrical, persistent, somewhat thickened above."

Modified description taken from Sacc. Syll., v. 7, p. 659.

1013. Portion of infected corn leaf. 1014. Uredospore, 1/12. 1015. Teleutospore, 1/12.

PUCCINIA TARAXACI (Ruben) Plowr.—On leaves of dandelion. Described by Sydow as follows:

"Uredospore sori amphigenous, often on spots, often without spots, scattered, sometimes confluent, minute, rotund or oblong, pulverulent, brown, uredospore globose, subglobose or ovate, echinulate, light brown, 22-27 x 16-24 μ, teleutospore sori similar, about ½-¾ mm. in diameter, dark or black-brown, teleutospores ellipsoid or ovate-ellipsoid, apex rotund not thickened, middle of spore not or slightly constricted, base for the most part rotund, delicately verrucose, brown 25-38 x 16-24 μ, epispore thin, pedicel hyaline, short."

1016. Infected portion of leaf of *Taraxacum taraxacum.* 1017. Uredospore, 1/12.

PUCCINIA TRITICINA Eriks.—On wheat. Described by McAlpine as follows:

"II. Uredosori 1-2 mm. long, reddish-brown, amphigenous but mostly on upper surface of leaf blade, elliptic, sometimes confluent, scattered or somewhat gregarious, occasionally on sheath and stem."

"Uredospores subglobose to shortly ellipsoid, echinulate, orange-yellow, 4-6 scattered germ pores on one face, 20-28 x 18-21 μ."

"II. Teleutosori oblong, black, to dark brown, hypophyllous, scattered, often arranged lengthwise in lines, sometimes on sheath and stem, covered by epidermis, divided into compartments surrounded by brown paraphyses."

"Teleutospores clavate to oblong, smooth, yellowish-brown to dark-brown, slightly constricted at septum, very occasionally 3-celled, 39-57 x 15-18 μ, average 48-16 μ; upper cell deeply colored, generally rounded or flattened at apex and thickened, 17-31 x 15-18 μ; lower cell paler and attenuated towards pedicel, longer and narrower than upper, 22-36 x 12-14 μ; pedicel short, colored."

"X. Mesospores occasional, similarly colored to teleutospores, ellipsoid to clavate or sub-clavate, shortly stalked, smooth, slightly

thickened at apex, 25-38 x 13-16 μ." McAlpine, "The Rusts of Australia," p. 132 (1906).

1018. Part of infected leaf of wheat. 1019. Same showing sori, 2/3. 1020. Uredospore, 1/12. 1021. Teleutospores, 1/12.

PUCCINIA XANTHII Schw.—On *Xanthium* sp. Described by Burrill as follows:

"III. Hypophyllous. Sori small, mostly closely clustered in spots or patches; spores smooth, oblong, evidently constricted, apex slightly thickened, round, or beak-like, 15-21 by 36-51 μ; pedicel slightly colored, usually shorter than spore." Parasitic Fungi of Illinois I, 184.

1022. Under side of infected leaf of *Xanthium* sp. 1023. Teleutospore, 1/12. 1024. Germinating teleutospores, 1/12.

CÆOMA NITENS, Schw.—On the leaves of cultivated blackberry and raspberry. Described by Burrill as follows:

"Hypophyllous. Sori irregular, flat, usually thickly associated and confluent, more or less covering the surface, bright orange-yellow; spores subglobose, elliptical or oblong, epispore thin, finely tuberculate, 12-24 by 18-32 μ; spermagonia scattered, numerous, yellow, mostly on upper side of the leaf." Parasitic Fungi of Illinois, p. 220.

1025. Infected leaf of dewberry. (R. *canadensis*). 1026. Cross-section of same, 2/3. 1027. Spores, 1/12. 1028. Germinating spores, 1/12.

NIGREDO CALADII (Schw.) Arth.—On *Arisæma triphyllum*.

"O. Pycnia from a perennial mycelium, chiefly hypophyllous, sometimes occurring also on the floral parts, evenly and extensively scattered over large areas, preceding or accompanying the æcia, abundant, punctiform, noticeable, half immersed, honey-yellow, becoming brownish, globose, 100-160 μ in diameter, 96-128 μ high; ostiolar filaments rather short, 35-50 μ."

"I. Aecia from a perennial mycelium, chiefly hypophyllous, rather evenly and extensively scattered, short becoming cuculate, about 0.2-0.4 mm. in diameter, peridium colorless, the margin erect or somewhat spreading and recurved, finely eroded or sparingly lacerate, peridial cells oblong or slightly rhomboidal, about 23-32 μ long, 15-19 μ thick, the inner wall moderately verrucose, 3-4 μ, the outer wall inconspicuously striate, 6-8 μ; æciospores subglobose or ellipsoid 15-20 by 17-24 μ; wall pale yellow, moderately thin, about 1.5 μ, evenly and finely verrucose."

"II. Uredinia amphigenous, scattered, roundish, 0.5-0.8 mm. across, rather tardily naked, light cinnamon-brown, ruptured epidermis conspicuous; urediniospores ellipsoid, obovoid, or sometimes almost cuneiform, 15-24 by 24-35 μ, rounded above, often narrowed and rather sparingly echinulate, the pores 4, equatorial."

"III. Telia amphigenous, scattered, roundish, or often irregular, rather tardily naked, light chestnut-brown, ruptured epidermis conspicuous; teliospores ellipsoid or obovoid, 17-24 by 23-35 μ, rounded or obtuse above and below, wall cinnamon-brown, 1.5-2 μ thick, with a small hyaline papilla at apex, 3-5 μ, smooth; pedicel hyaline, short, deciduous." North American Flora, v. 7, p. 236 (1912).

1029. Infected spathe of *Arisaema triphyllum*. 1030. Aecidium, 2/3. 1031. Cross-section of leaf showing aecidium, 2/3. 1032. Peridial cell, 1/12. 1033. Aeciospores, 1/12.

NIGREDO FALLENS (Desmaz.) Arth.—On *Trifolium pratense*.

"O. Pycnia and æcia uncertain. II. Uredinia chiefly hypophyllous, scattered, rather early naked, roundish or oval, 0.3-0.8 mm. in diameter, pulverulent, pale, cinnamon-brown, ruptured epidermis conspicuous; urediniospores broadly ellipsoid or obovate-ellipsoid 19-23 by 22-26 μ; wall light cinnamon-brown 1.5-2 μ thick, rather sparsely echinulate, the pores 4-6 scattered."

"III. Telia chiefly hypophyllous, scattered, rather tardily naked, roundish or oval, 0.3-0.8 mm. in diameter, somewhat pulverulent, dark cinnamon-brown, ruptured epidermis conspicuous; teliospores broadly ellipsoid or obovoid, 16-20 by 20-27 μ; wall cinnamon-brown, moderately thick, 1.5-2 μ, often with an inconspicuous hyaline papilla over the germ-pore, smooth, or more usually with a few irregularly scattered, roundish warts; pedicel short, hyaline, deciduous." North American Flora, v. 7, p. 254 (1912).

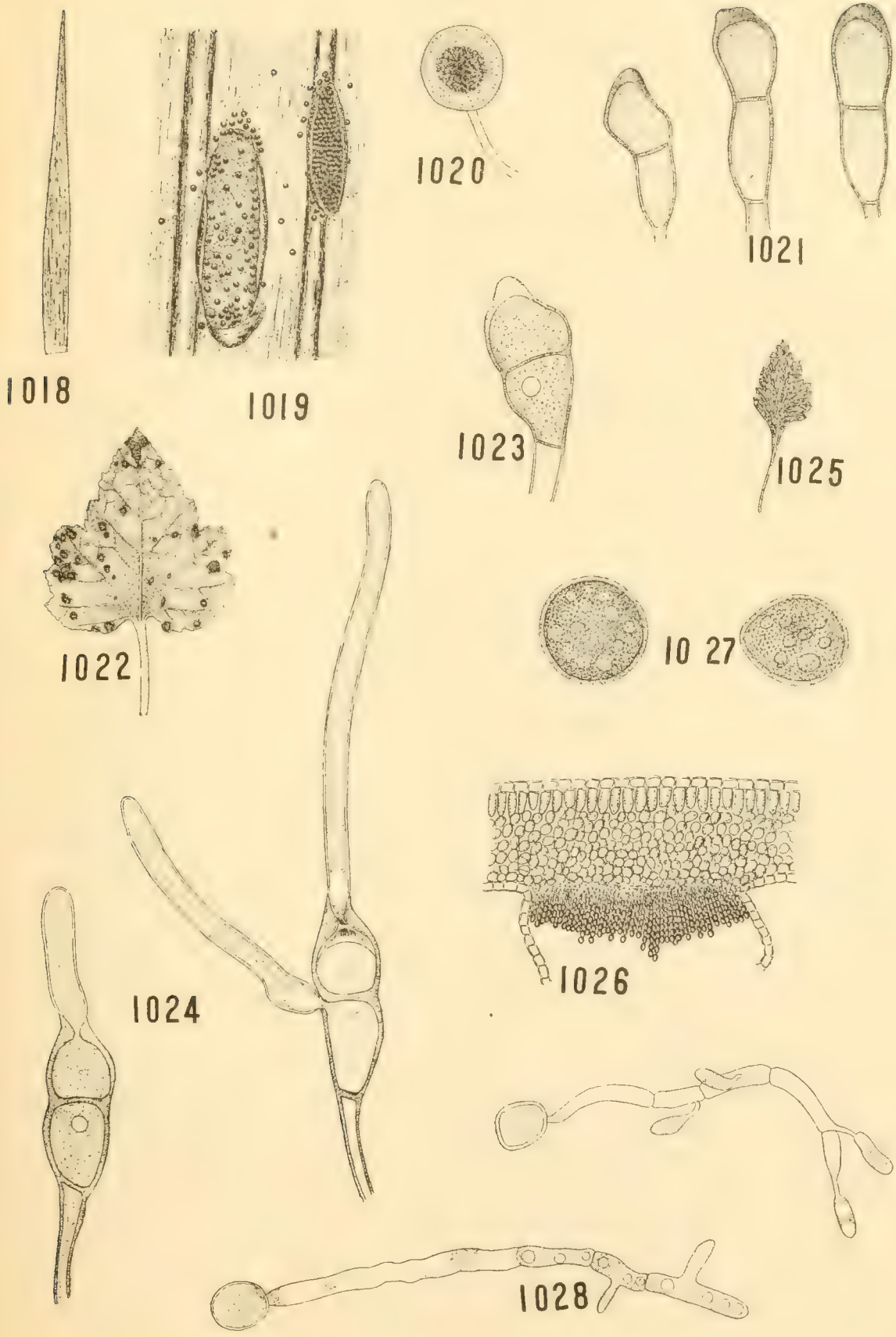
Note:—The æcial stage on red clover was reported at the New York meeting of the American Phytopathological Society, December, 1916, by W. H. Davis and A. G. Johnson.

1034. Infected leaf of *Trifolium pratense*. 1035. Teleutospores, 1/12.

NIGREDO PLUMBARIA (Peck.) Arth.—On *Œnothera biennis*.

"O. Pycnia chiefly hypophyllous, rather few, loosely scattered, punctiform, honey-yellow becoming brownish, flattened, globoid, 128-144 μ in diameter by 82-112 μ high."

"I. Aecia chiefly hypophyllous, numerous, rather evenly and thickly effused over large areas, often occupying all of the under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surface of a leaf, cupulate, short, 0.2-0.4 mm. in diameter; peridium whitish, the margin spreading or somewhat recurved, irregularly lacerate; peridial cells rhomboidal, 12-16 by 16-24 μ, the outer wall rather thick, 6-7 μ, striate, the inner wall thinner, 3-4 μ, moderately verrucose; æciospores globoid, 12-16 by 14-18 μ; wall colorless, thin, 1-1.5 μ, finely verrucose."

"II. Uredinia amphigenous, scattered, roundish, about 0.4-0.7 mm. across, rather early naked, pulverulent, dark cinnamon-brown, ruptured epidermis noticeable; urediniospores broadly ellipsoid or obovoid, 15-23 by 20-26 μ, wall golden-brown, 1.5-2 μ thick, finely and rather sparsely echinulate, the pores 2 or 3, approximately equatorial."

"III. Telia amphigenous, scattered, roundish or oval, 0.5-1 mm. or more across, rather early naked, somewhat pulverulent, slightly pulvinate, chocolate-brown, ruptured epidermis conspicuous; teliospores obovate or oblong, 15-23 by 22-35 μ, roundish, obtuse, or less often acute above, usually narrowed below; wall light to dark cinnamon-brown, moderately thick, 2-2.5 μ, much thicker at the apex, 5-10 μ, smooth pedicel somewhat tinted next to the spore, fragile, about one and a half times length of spore, usually broken away and appearing short." North American Flora, v. 7, p. 262 (1912).

1036. Uredospores, 1/12.

NIGREDO POLYGONI (Pers.) Arthr.—On *Polygonum* sp.

"O. Pycnia amphigenous, few, in small groups, about 0.5 mm. across, inconspicuous, honey-yellow becoming brownish, depressed-globoid, 112-144 μ in diameter, 75-100 μ high, ostiolar filaments 75-90 μ long."

"I. Aecia amphigenous, gregarious, in annularly or crowded groups 1-1.5 mm. across, on discolored spots, short, cupulate, or occasionally somewhat elongate, 0.1-0.2 mm. in diameter; peridium colorless, the margin cross; peridial cells rhomboidal 26-32 μ long, overlapping, the outer wall rather thick, 6-8 μ, transversely striate, the inner wall thinner, 2-3 μ, somewhat striate, very moderately verrucose; æciospores globoid, 15-18 by 16-19 μ; wall light yellow or colorless, thin, 1 μ, finely verrucose."

"II. Uredinia amphigenous, scattered, roundish, 0.3-0.8 mm. across, early naked, somewhat pulverulent, cinnamon-brown, ruptured epidermis conspicuous; urediniospores broadly ellipsoid or obovoid, 15-22 by 19-27 μ; wall golden-brown 1.5-2 μ thick, finely and closely verrucose, the pores 4, equatorial."

"III. Telia amphigenous, scattered, oval or oblong, 0.5-1 mm. long, often confluent, early naked, pulvinate, chocolate-brown, ruptured epidermis noticeable; teliospores broadly ellipsoid or obovate-ellipsoid, 16-24 by 23-32 μ, slightly narrowed below, usually rounded above; wall cinnamon-brown, 2-3 μ thick, thicker at apex, 4-7 μ, smooth; pedicel hyaline, once to twice length of spore." North American Flora, v. 7, p. 243 (1912).

1037. Uredospore, 1/12. 1038. Teleutospores, 1/12.

NIGREDO SEDITIOSA (Kern) Arth.—On *Aristida purpurascens.*

"O. Pycnia amphigenous, few, on discolored spots 0.5-4 mm. across, inconspicuous, honey-yellow becoming brownish, subglobose, laterally compressed, 80-100 μ in diameter by 100-112 μ high; ostiolar filaments 46-65 μ long."

"I. Aecia amphigenous, gregarious, in crowded or sometimes annular groups on discolored spots 0.5-4 mm. across, cupulate or short cylindrical, 0.2-0.3 mm. in diameter; peridium colorless, the margin erose, erect or somewhat recurved; peridial cells rhombic in longitudinal section, 17-19 by 28-35 μ, the outer wall very thick, 10-13 μ, transversely striate, smooth, the inner wall thinner, 4-5 μ, somewhat striate, moderately verrucose, æciospores subglobose or broadly ellipsoid, 14-18 by 16-22 μ; wall colorless, rather thin, 1.3 μ, finely verrucose."

"II. Uredinia epiphyllous, scattered, linear or oblong, cinnamon-brown, moderately thick, 2-2.5 μ, very minutely verrucose, appearing almost smooth when wet, the pores rather indistinct, 4, equatorial."

"III. Telia epiphyllous, scattered or sometimes crowded and irregularly confluent, oblong, or linear, 0.2-0.5 mm. wide by 0.5-1 mm. or more long, early naked, conspicuous, compact, pulvinate, dark chocolate-brown, ruptured epidermis not noticeable, teliospores broadly ellipsoid, or obovoid to nearly globoid, 15-21 by 23-29 μ, rounded or obtuse at both ends; wall chestnut-brown usually with a slightly paler umbo, about 1.5-2 μ thick, much thicker at apex, 5-10 μ smooth; pedicel slightly colored, rather stout, once to twice length of spore." North American Flora, v. 7, p. 225 (1912).

1039. Teleutospores, 1/12.

NIGREDO SPERMACOCES (Schw.) Arth.—On *Diodia teres.*

"O. Pycnia epiphyllous, few, gregarious, inconspicuous, yellowish,

becoming darker with age, globoid, 120-140 μ; ostiolar filaments apparently rather short."

"I. Aecia hypophyllous, crowded in irregular groups 1-2.5 mm. across, short, cupulate, 0.2-0.3 mm. in diameter peridium colorless, erect, the margin lacerate; peridial cells rhomboidal, 13-19 by 29-34 μ, somewhat overlapping, the outer wall 4-6 μ thick, transversely striate, the inner wall, rather coarsely verrucose; æciospores globoid, 21-26 by 21-28 μ; wall colorless, 1-1.5 μ, inconspicuously verrucose."

"II. Uredinia chiefly epiphyllous, numerous, scattered, roundish, 0.2-0.5 mm. across, tardily naked, pulverulent, light cinnamon-brown, the over-arching epidermis ruptured by an uneven slit; urediniospores broadly ellipsoid, 18-24 by 26-32 μ; wall golden-brown, 1-2 μ, rather finely echinulate, the pores 2, opposite, equatorial.

"III. Telia amphigenous and caulicolous, numerous, scattered, crowded and confluent on stems, roundish or oval, 0.2-1 mm. across, rather early naked, compact, pulvinate, blackish, ruptured epidermis at first conspicuous, later disappearing; teliospores broadly ellipsoid, 19-27 by 29-37 μ; wall dark chestnut-brown, thick, 2-3 μ, with a lighter-colored broad cap making the wall at the apex 6-10 μ thick, smooth; pedicel light-yellow, usually persistent, uniform, about twice the length of the spores." North American Flora, v. 7, p. 266 (1912).

1040. Teleutospores, 1/12.

NIGREDO TRIFOLII (Hedw.) Arth.—On *Trifolium repens.*

"O. Pycnia chiefly epiphyllous, in small groups or sometimes spread out over larger areas, not conspicuous, honey-yellow becoming reddish-brown, globoid, 100-130 μ in diameter; ostiolar filments up to 30 μ long.

"I. Aecia amphigenous, in roundish crowded groups or on the veins and petioles in elongate groups, short, cupulate, 0.2-0.3 mm. in diameter; peridium white, the margin erect or slightly recurved, finely erose; peridial cells rhomboidal, slightly overlapping, 13-15 μ broad by 18-26 μ long, the outer wall rather thick, 5-6 μ, transversely striate, smooth, the inner wall thinner, 2-3 μ, moderately verrucose; æciospores broadly ellipsoid or somewhat angular, 15-17 by 16-21 μ; wall light-yellow or nearly colorless, thin, about 1 μ, finely verrucose."

"II. Uredinia amphigenous, scattered, oval or roundish, 0.3-0.6 mm. in diameter, rather tardily naked, pulverulent, cinnamon-

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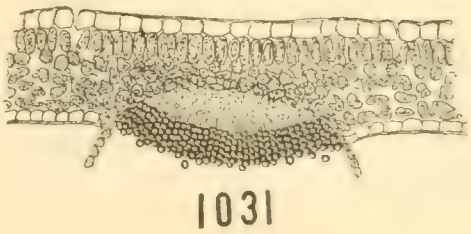
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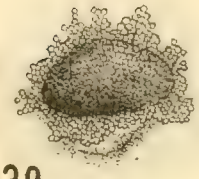
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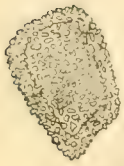
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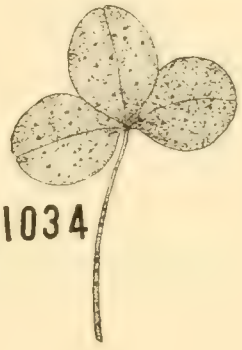
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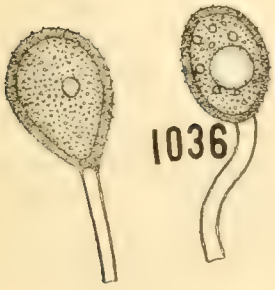
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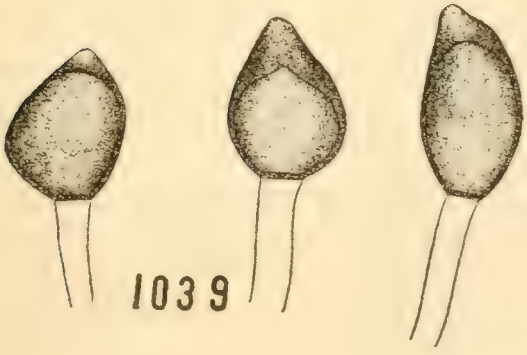
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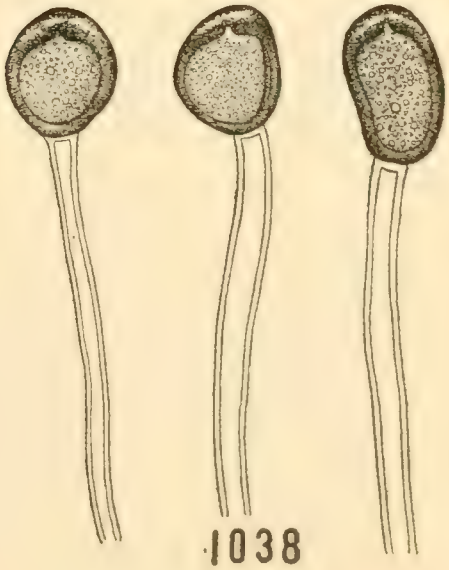
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brown, ruptured epidermis conspicuous; urediniospores broadly ellipsoid, 18-21 by 21-26 μ, wall golden-brown, rather thin, about 1.5 μ, rather sparsely echinulate, the pores 3 or 4, equatorial."

"III. Telia chiefly hypophyllous, scattered, oval or roundish, variable in size, 0.3-0.8 mm. or more in diameter, rather tardily naked, somewhat pulverulent, chestnut-brown, ruptured epidermis conspicuous; teliospores broadly ellipsoid or obvate-ellipsoid, 13-19 by 20-29 μ; wall cinnamon-brown, rather thin, about 1.5 μ, with a small hyaline papilla over the germ-pore, smooth, or with a few, small sparsely scattered papillæ; pedicel colorless or slightly tinted, short." North American Flora, v. 7, p. 255 (1912).

1041. Infected leaf of *Trifolium repens*. 1042. Peridial cell, 1/12. 1043. Aeciospore, 1/12. 1044. Uredospore, 1/-2.

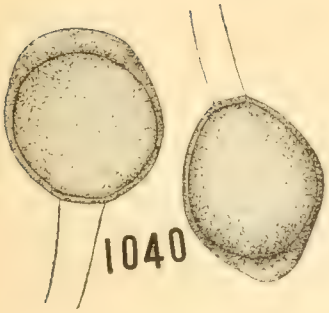
NIGREDO PRŒMINENS (D. C.) Arthur.—On *Euphorbia preslii*, described by Arthur (manuscript) as follows:

Pycnia hypophyllous, widely scattered among the æcia, rather few, punctiform, honey-yellow becoming brownish, globoid, 130-145 μ in diameter; ostiolar filaments up to 65 μ long.

Aecia chiefly hypophyllous, from an unlimited mycelium, usually occupying all of the under surface of the affected leaves, evenly and often densely scattered; short, cupulate, 0.3-0.4 mm. in diameter; peridium somewhat recurved, lacerate; peridial cells rhomboidal, somewhat overlapping, 13-19 μ broad by 18-25 μ long, the outer wall rather thick, 4-7 μ, transversely striate, smooth, the inner wall thinner, about 3 μ, somewhat striate, somewhat verrucose; æciospores globoid or broadly ellipsoid, 12-16 by 15-19 μ, wall pale yellow or colorless, thin, 1 μ, finely and densely verrucose.

Uredinia amphigenous, scattered or sometimes in annular or crowded groups, roundish, 0.4-1 mm. across, early naked, pulvinate, pulverulent, cinnamon-brown, ruptured epidermis not conspicuous; urediniospores globoid or broadly ellipsoid, 15-20 by 19-23 μ; wall pale golden brown, rather thin, about 1.5-2 μ, moderately and sparsely echinulate, the pores 3-6, scattered.

Telia amphigenous, scattered or sometimes in annular groups, roundish, 0.4-1 mm. across, early naked, pulvinate, somewhat pulverulent, dark chocolate-brown, ruptured epidermis not conspicuous; teliospores broadly ellipsoid or obovoid, 15-18 by 18-26 μ, usually rounded at both ends; wall cinnamon-brown, rather thin, 1.5 μ, with a lighter-colored, flattish or conical papilla over the germ-pore, moderately verrucose with papillæ scattered or sometimes arranged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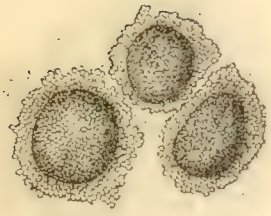
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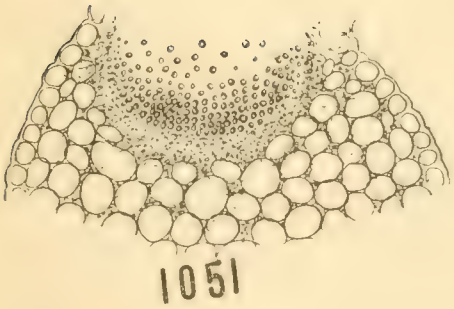
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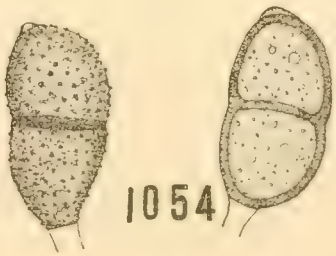
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in more or less evident longitudinal rows; pedicel hyaline, short, deciduous."

1045. Aecia, 2/3. 1046. Peridial cells, 1/12. 1047. Aeciospores, 1/12. 1048. Uredospores, 1/12.

ALLODUS CLAYTONIATA (Schw.) Arth.—On *Claytonia virginica*. "Aecia amphigenous, regularly scattered, often over large areas and covering entire leaf and petiole, æciospores 13-21 by 18-23 μ; wall 1-1.5 μ thick.

Telia chiefly hypophyllous, often thickly scattered, sometimes confluent, small roundish, tardily naked, cinnamon-brown, pulvinate, ruptured epidermis noticeable, teliospores elliptical to terete, sometimes angular, 18-27 by 30-48 μ; wall light cinnamon-brown, 1.5-2 μ thick, apex often thickened up to 7 μ by a hyaline papilia, evenly and finely verrucose; pedicel colorless, short." Orton, C. R., North American Species of Allodus.—Mem. N. Y. Bot. Garden 6, p. 184 (1916).

1049. Infected plant of *Claytonia virginica* showing æcia. 1050. Infected leaf of same showing teleutospores. 1051. Cross-section of æcia, 2/3. 1052. Peridial cell, 1/12. 1053. Aeciospores, 1/12. 1054. Teleutospores, 1/12.

ALLODUS PODOPHYLLI (Schw.) Arth.—On *Podophyllum peltatum*. "Aecia chiefly hypophyllous, closely gregarious on yellowish spots, sometimes over large areas; æciospores 18-24 by 19-29 μ; wall about 1 μ thick, minutely verrucose."

"Telia amphigenous and caulicolous, small, round, often gregarious in more or less orbicular areas on yellowish spots, tardily naked, chocolate-brown; teliospores clavate to elliptical, 19-26 by 40-55 μ, wall chestnut-brown, uniformly 1.5-2 μ thick, sparingly beset with spines about 7 μ long; pedicel golden yellow, rarely half length of spore." Orton, C. R., North American Species of Allodus.—Mem. N. Y. Bot. Garden 6, p. 187 (1916).

1055. Aeciospores, 1/12. 1056. Teleutospore, 1/12.

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